DOMESTIC ENGINEERING

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Good buyers refrain from showing to salesmen of competing companies quotations which have been made them on material to be purchased. The salesman instantly knows his own quotation will be shown to the next salesman who may come along, in the buyer's attempt still further to reduce the price. Quotations of price are generally recognized as private correspondence. The man who shows such confidential communications is placed in the class of undesirables. A buyer may very well announce a price above which he will not pay, but he should protect his sources of supply by keeping their correspondence inviolate.

Look to the South

John Barrett, formerly American minister to Siam, Argentina, Panama and Columbia and now the director of the International Bureau of American Republics in Washington, says that before the end of the century Brazil will be one of the greatest sources of coal supply in the world. More than that, he claims that this republic of South America will be the home of an active, industrious population numbering one hundred and fifty million people, engaged in productive energy equal to that of the United States today. The basis of Mr. Barrett's prediction are these facts: The area of Brazil is 3,218,139 square miles; it is larger than the United States by the size of Germany; the present population is about twenty million people, which is greater than that of the United States at the beginning of the last century. The people of Brazil themselves divide their great country in three divisions—the tropical zone, the sub-tropical zone and the temperate zone. The tropical zone is in the Amazon valley and contains practically the whole of a system of waterways, with thousands of square miles of navigable rivers, which tend toward the open sea at the equator, and yet this great stretch of country is not so much of an unexplored region as was the great west of the United States one hundred years ago. One thousand miles up the Amazon river is a city of fifty thousand people, with trolley cars, electric lights and all modern conveniences and luxuries, and every form of industry and commerce thrive in this great river region. The sub-tropical zone of Brazil extends from Bahia on the north to Santos on the south, and is a very fertile district, containing in the interior a plateau capable of supporting millions of human beings. The temperate zone is the smallest, and its possibilities are comparable to those of our own states of North and South Carolina, Kentucky and Tennessee. At no time in the United States has American capital and American enterprise been looking toward South America with half the longing which it is at the present time. In all of the seaboard towns a great deal of talk is heard with regard to the possibility of building up a great commerce with the South American republics. Germany, England and France have so far monopolized this trade. The United States has lagged behind in an incredible fashion, but with the construction of the Panama canal the shortening of the sea routes will bring to the United States the trade of this rich country, the future possibilities of which are at the best unknown. The mill supply, plumbing and engineering lines are vitally interested in the development of this new field of commercial activity, and are watching events with careful eyes. We prophesy that the lines of commerce represented by "Domestic Engineering" will be among the first actively to exploit the great field lying at our southern border.

Heating by Forced Hot Water Circulation

By Chas. L. Hubbard

(Conclusion.)

Systems of Piping.—The mains for forced circulation are usually run in one of two ways, called the two-pipe system and the single-pipe or circuit system. The arrangement of the former is shown in Fig. 6. The supply and return in this case are carried side by side, the former reducing in size and the latter increasing as the branches are taken off.

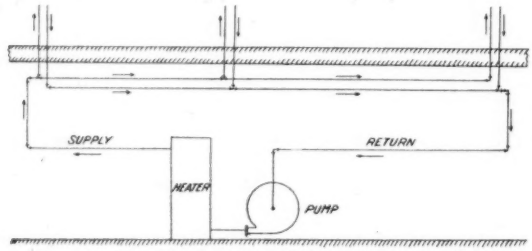

Fig. 6. Showing arrangement of two pipe system.

The circulation through the risers and radiators is caused by the difference in pressure in the supply and return mains. This pressure is evidently the greatest near the pump, hence it is necessary to place throttle valves in all of the risers to prevent short-circuiting and to equalize the flow through all parts of the system. The radiators are not shown in the cut, but the direction of flow through the supply and return risers is indicated by the arrows. In the single-pipe or circuit system shown in Fig.

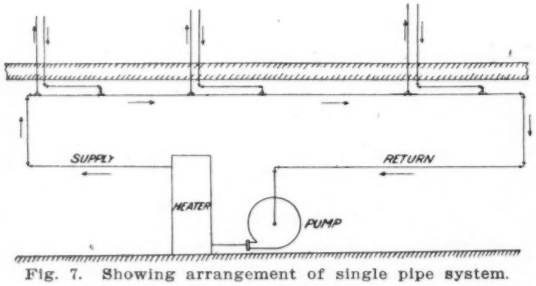

Fig. 7. Showing arrangement of single pipe system.

7, a single large main is carried entirely around the basement, the ends being connected with the discharge and suction of the pump. As the pressure head drops constantly throughout the circuit from the discharge back to the pump inlet, it is evident that if a supply riser be taken off at any point and the return be connected into the main a short distance along the line, there will be a sufficient difference in pressure between these two points to produce a circulation through the two risers and the connecting radiators. A distance of 8 or 10 feet between the connections is usually sufficient to produce the necessary circulation; and even a less distance will answer if the supply is taken from the top of the main and the return connected into the side.

Size of Mains.—As the velocity of flow is independent of the temperature and elevation when a pump is used, it is necessary to consider only the volume of water to be moved and the length of run. The volume of water which it is necessary to circulate is found by the formula

$$Q = \frac{R.\ E.}{500\ T.}$$ in which

Q=gallons of water per minute.

R=square feet of radiation to be supplied.

E=efficiency of radiating surface, which may be taken as 170 for direct, and 400 for indirect.

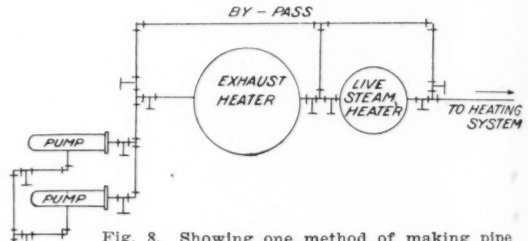

Fig. 8. Showing one method of making pipe connections at pumps and heaters.

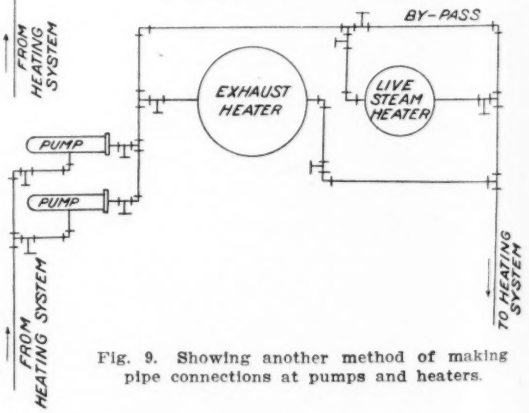

Fig. 9. Showing another method of making pipe connections at pumps and heaters.

T=Drop in temperature, which may be taken as 30 to 40 degrees.

The first step is evidently to determine the volume of water which it is necessary to circulate in order to give off the required amount of heat. After this is found, a velocity of flow is assumed and the necessary pipe area computed. For 5 to 8 inch pipes the velocity may be taken at 400 to 500

feet per minute, although a velocity of 600 feet may be allowed in pipes of large size. For smaller pipes it is customary to circulate the water at a somewhat lower velocity, say from 250 to 300 feet per minute for a 3-inch pipe. The next step is to find the pressure or head necessary to produce the required velocity. The water in a heating system being in a state of equilibrium, the only force necessary is that required to overcome the friction in the pipes and radiators, and as the area of the passageways through the latter is usually large in comparison with the mains it is customary to consider only the head necessary to overcome the friction in the latter, including the additional resistance due to valves and fittings. The following table gives the friction of fittings and valves expressed in additional feet of straight pipe of the same diameter.

TABLE I.

Long turn elbow	equal	4 feet of pipe
Short turn elbow	equal	9 feet of pipe
6-inch swing check	equal	50 feet of pipe
4-inch swing check	equal	25 feet of pipe
6-inch globe check	equal	200 feet of pipe
4-inch globe check	equal	130 feet of pipe

TABLE II.

Capacity in gallons per minute. Head in feet per 100 feet length of pipe.

	—3-In. Pipe—		—4-In. Pipe—		—5-In. Pipe—	
Velocity—	Capacity.	Head.	Capacity.	Head.	Capacity.	Head.
300.....	110	3.41	195	2.56	306	2.05
480.....	176	8.16	314	6.12	490	4.9
540.....	198	10.1	352	7.64	550	6.11

	—6-In. Pipe—		—7-In. Pipe—		—8-In. Pipe—	
Velocity—	Capacity.	Head.	Capacity.	Head.	Capacity.	Head.
300.....	440	1.70	600	1.46	783	1.28
480.....	705	4.08	959	3.49	1,253	3.06
540.....	794	5.09	1,079	4.36	1,410	3.82

The pipe contains 16 long turn elbows and 1 swing check. What diameter of main should be used?

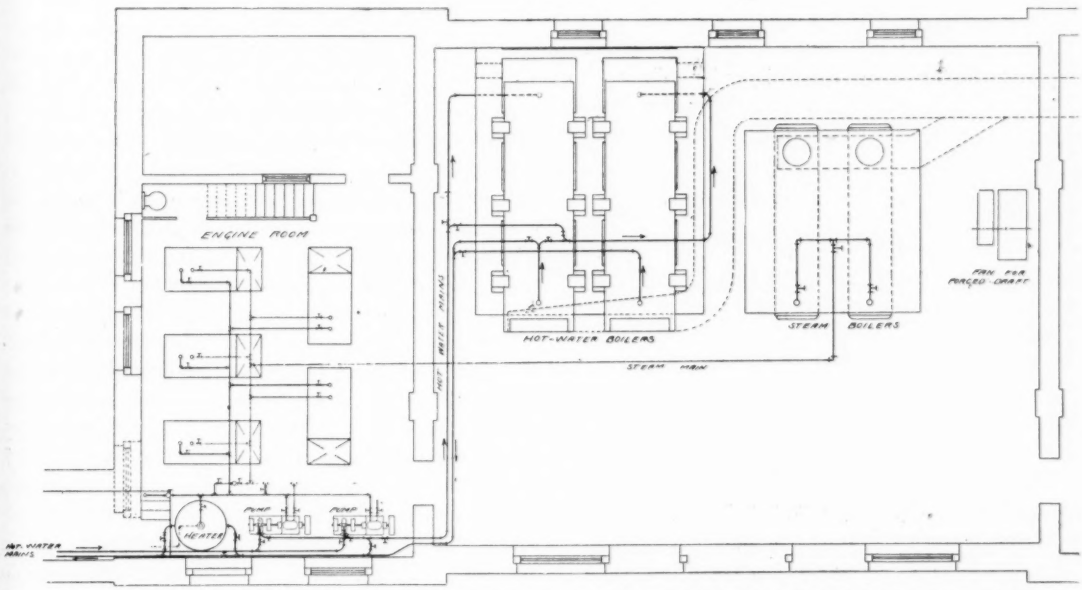

Fig. 10. Showing a typical layout of boiler and engine room, where water is heated partly by steam and partly by special hot water boilers.

In practice it is customary to make the mains of such size that the friction head will not exceed 50 or 60 feet, and better pump efficiencies will be obtained with heads of 35 to 40 feet.

Table II gives the gallons of water discharged per minute by different sizes of pipe under varying pressure heads.

The use of the table may be made clearer by a practical example.

A heating system requires the circulation of 1,000 gallons of water through a circuit main 400 feet in length.

Assuming a trial velocity of 540 feet per minute we find from Table II that a 7-inch pipe will be required to deliver the required volume of water and also that a head of 4.36 feet will be necessary for each 100 feet length of pipe.

The actual length of the main, including the equivalent of the fittings as additional length is

$400 + (16 \times 9) + 50 = 594$ or 600 feet in round numbers; hence the total head required is $6 \times 4.36 = 26.16$ feet. As both the friction head and trial velocity come within practical limits this is the size of pipe we should use.

If it was desired to reduce the power for running the pump a larger pipe could be used with a proportional reduction in head and therefore in power.

The above applies to the supply and return mains; the risers, in case of the circuit main system, may be made the same as for gravity work, while for the two-pipe system, they can be made somewhat smaller, a reduction of one size for diameters over 1¼ inches being common.

The branches connecting the risers with the mains may be proportioned from the combined areas of the risers connecting with them

Pipe Connections.—The method of making the pipe connections at the pumps and heaters varies some with local conditions and the system used. In the Evans-Almiral system the exhaust and live steam heaters are placed in series as already stated, the water being first forced through the exhaust heater on account of its lower temperature and then through the live steam heater in order to bring it up to its maximum temperature. In the system installed by the General Fire Extinguisher Co., the two heaters are connected up in parallel and the proper amount of water is forced through each by means of throttle valves. These two systems are shown in Figs. 8 and 9 respectively. It is customary to install two pumps, each of sufficient size to do the whole work and so connected that either may be used independently of the other. The heaters are by-passed so that either or both may be used as desired.

Fig. 10 shows a typical layout of boiler and engine room where the water is heated partly by steam and partly by special hot-water boilers. The steam heater is supplied with exhaust from the engines and has a cross-connection with the high pressure main through a reducing valve. The water from the heating system returns directly to the pump suction and is then forced first through the steam heater and then through the boilers. The piping and valves are so arranged that the steam heater may be by-passed and the water heated by the boilers, either singly, in series, or in parallel as required, or the work may be done entirely by steam if so desired. The pumps and heater are located in the engine room and the water heating boilers are in the adjacent boiler room.

The steam boilers are shown by dotted lines and are placed just beyond the water boilers.

This system of heating is used extensively in office buildings and other buildings of large size where it is desired to retain the advantages of hot water heating and where the runs of pipe would be of too great a length for gravity circulation.

The Problem of Heating Mills

By A. S. Atkinson

Some Suggestions to be followed in the Installation of Heating Systems for Factories

The problem of heating mills and similar large plants economically and efficiently differs so in isolated cases that the adaptation of the various systems to the special needs is not always an easy matter to settle. The chief requirement of any system is efficiency so that the heat can be equally distributed at all times and be relied upon in any temperature. Next to this is the question of economy, and no system is perfect unless the cost is brought within reasonable limits.

Mill heating differs to a large extent from house or office heating, for in the majority of cases the mill or factory has its own steam generating plant, and the heating is generally connected in some way with this. In recent years a good deal of effort has been expended in trying to utilize the exhaust steam for heating purposes, thus bringing the cost of heating down to an insignificant point. The use of exhaust steam for heating has its advantages, and sometimes it eminently proves satisfactory. This system is practicable where non-condensing engines are used, but otherwise it offers too difficult problems to be met with satisfactorily.

Radiation with exhaust steam from non-condensing engines, however, is not altogether a simple matter unless all conditions are favorable. One of the greatest mistakes made in this field is in the attempt to heat too large an area with the exhaust. There is in such cases a danger of the steam condensing before it reaches the end of the journey through the pipes, and consequently a complete loss. A great many failures can be attributed to this fact. The exhaust steam does not have the pressure of live steam and it will not travel so readily and quickly through the piping system. Therefore, it is not possible to utilize as large and complicated a system as ordinarily employed for live steam. The question of ascertaining in advance the exact amount of piping that can be

heated by the exhaust is the first great essential step.

Improvements have been made in this system in the last few years through the use of a vacuum at the discharge end of the pipes. This improves the system very much, and draws the exhaust steam to the furthest part of the pipes. The cost of installing such a vacuum device is, of course, quite considerable, and much be considered in the general design. The maintenance of this vacuum at all times is essential, and it presupposes quite an elaborate equipment. In large mills and factories where the exhaust is sufficient for heating through this method, it pays to go to this extra expense, but not in a very small factory or where there may be some doubts about the sufficiency of radiation.

Some have attempted to utilize back pressure of the engine to increase the circulation of the exhaust steam, but this is always of doubtful utility. One pound of back pressure to any engine means a considerable loss of working efficiency, and it cannot be made up by adding a pound to the initial pressure. There is a loss that must be added to the cost of the heating system. The back pressure facilitates the circulation of the exhaust, but it is questionable whether the admission of a little live steam directly into the pipes will not accomplish more economical results. A good many plants have utilized this last method. A small auxiliary engine is used for injecting live steam directly into the exhaust for the purpose of increasing its circulation. This auxiliary engine is available in plants where steam is shut down at nights. Naturally there is no exhaust available for heating except when the plant is in working condition. Consequently the auxiliary engine supplies the deficiency.

Such a small auxiliary has the further advantage of being useful in operating small machines occasionally or for preheating boiler water for the larger engines. The installation of such an auxiliary to a large plant recently proved very effective in bringing up an inferior heating device to its full power of radiation. In designing a heating system for a manufacturing plant, it is well to remember that one dependent upon exhaust steam is put out of commission when the plant is shut down. In fact, it must depend upon the engines running at their highest for the best efficiency. There is no economy obtained if the engines must be run often simply to furnish exhaust for the heating system. Most mills are run continuously through cold weather, and the designer simply has to figure upon the amount of exhaust that can be depended upon in regular working days. However, there is always the possibility of a plant being shut down indefinitely on account of strikes, repairs or dull times. and then the economy of using the exhaust steam for heating is entirely wiped out. A small auxiliary engine for heating with live steam may, during such times, more than pay for itself a dozen times over.

The equipment of a mill or factory with a direct system of heating with live steam means thoroughly reliable radiation at all times. In manufacturing plants where a series of outside buildings must be heated from one central engine the problems of equipment and installation are a little more difficult. In the future heating systems will depend for their success as much upon their economy as their efficiency. It is essential that reliability and efficiency should be obtained, but factory economics today demand that every waste and loss shall be eliminated. Now there is all the difference in the world between a poor and good heating system. One may cost from one-third to twice as much more as another.

The most important step in designing such a system of heating with live steam is to see that the heating plant is installed as centrally as possible, so that no very long pipes are required. This is particularly true in plants where many buildings are grouped irregularly together. Long pipes require more live steam to carry the circulation along and the condensation goes on much more rapidly a hundred feet from the boiler than within ten or twenty. In long pipes many reduce the size on account of the cost, but small pipes increase the chances of rapid condensation in long reaches, and also causes an increased waste. It is better to spend more in the initial installation and have a cheaper working system than to save on a few inches of pipe and cause a constant high cost of operation. Large pipes can be regulated much easier than small ones, and the radiation is just as good at the end as nearby.

The complete covering of the delivery pipes to the adjacent buildings is the next important step in the designing. The loss of steam heat through uncovered pipes is enormous, and when these are simply buried in the ground or carried overhead outdoors, with a slight covering, the cost of fuel to keep up the heat is very great. By all means the pipes should be covered with some non-conducting material, and then inclosed in conduits buried underground. These conduits may simply be wooden boxes packed with some material that will not absorb the heat. There is the argument against buried pipes that it is expensive to get at them when trouble happens, but if good outdoor service

pipes are properly made and put together nothing should happen to them for years. Inferior workmanship means trouble anywhere, above or below ground.

In the direct heating with live steam there must be careful estimation made of the comparative size of the heating plant and the space to be heated, as well as the proper distribution of the radiators. On one of these three rocks many a plant has broken down. The heating of any building is a science which is becoming more exact every year, and the man who can design a plant that will prove highly efficient, reliable and economical will generally find his services in demand. The point of economy is too frequently lost sight of. A plant that is too large or too small must always give bad satisfaction. In one case it eats up too much coal, and in the other it is forever failing in cold weather. No amount of careful distribution of pipes and radiators will make up for a too small heater.

Today there is no good reason why a heating system should not be installed to perfection. Every engineer of this science should know the exact amount of radiation required for a given space. From such calculations he can figure upon the size of his plant. But in factory and mill heating there is another factor that is worth considering, but which is often overlooked. Nearly every up-to-date mill is built with the possible idea of extending its size some day. Boilers are put up in batteries in such a way that new generating units can be added as prosperity demands more power. If the heating system does not take this into consideration there is apt to be great expense required to install a new plant or equip the old one with more boilers. Usually this is met by giving the heating system a certain flexibility by which it can be increased easily in service or by leaving room for an additional boiler for increasing the amount of live steam injected into the service pipes.

As an illustration of how this may sometimes be accomplished at great expense, a mill which had a good heating plant installed found it necessary to extend the size and number of the buildings to meet new business. Another small heating plant was installed in a place left for that purpose, and later, when another extension was made, the exhaust from the main boilers were utilized in another set of pipes. This method proved very costly and showed how there was direct loss throughout. If a single heating system had been originally designed with sufficient capacity for extension, none of this waste would have been made.

Duplication of parts is always unwise and wasteful. Where one pipe will do the service the result is better than two. A mill or manufacturing plant must always have a system with a fair margin for extra work or an elastic possibility which will enable the manager to have it extended to meet the requirements of new business. Another factory, which had a direct system of heating, found, when necessary to build another structure, that the heating system had no margin to work from. The heating plant was taxed to its limit to heat the old buildings. There was some talk of tearing out the old plant and installing a larger one. But this seemed like a big waste. The matter was finally settled by introducing a smaller system for the new building for utilizing the exhaust steam from the engines used in manufacturing. This system was entirely independent of the live steam plant, and it proved the most sensible and economical solution of the problem. The cost of installing it was comparatively small, and the radiation was sufficient for all needs. That plant got around a difficult problem in a way that many another could do with economy and efficiency.

The distribution of pipes and radiators is a matter which has frequently been discussed and worked out theoretically and practically for a great number of buildings. Not only must the size and location of the structures be considered, but in mills local conditions not found in a residence or office must come in for calculation. Some factories require that certain rooms be kept at a comparatively low temperature, and other adjoining should have a normal heat. Again, the admission of belts, shafts and other parts of the machinery through the walls or floors makes the temperature difficult to control on account of the cold air that inevitably flows through the holes and crevices. It may be possible in some cases to stop up such spaces and protect the inside, but it is always necessary to make extra provision for such rooms.

Agreed.

"Young man, I was told today that you were the worst boy in the neighborhood."

"Gee, if I was a man and anyone talked that way about my little boy some one would get licked."

"Some one is going to get licked now; take off your coat."—Houston Post.

The Pessimist.

Dough: "Yes, old man, I'm going to spend the winter in Florida."

Wough: "Lucky dog! It'll be nice and warm down there."

Dough: "Yes; but I'll bet there'll be mosquitoes or something"

Hot Water for Domestic Use—XV*

EDITED BY JNO. K. ALLEN

Mem. Am. Soc. Inspectors of Plumbing and Sanitary Engineers; Mem. Royal Sanitary Institute of Great Britain; Assoc. Mem. Am. Soc. Heating and Ventilating Engineers; Hon. Mem. Chicago Architectural Club.

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Some means besides a waterback in the coal range is sometimes desirable for heating water in range boilers. When such is the case, the most natural apparatus to select for the purpose is a special gas water heater. Of course a heating coil or waterback could be placed in the flame of an ordinary gas range, but so small a percentage of the heat would be utilized that such a method would prove exceedingly expensive as well as unsatisfactory.

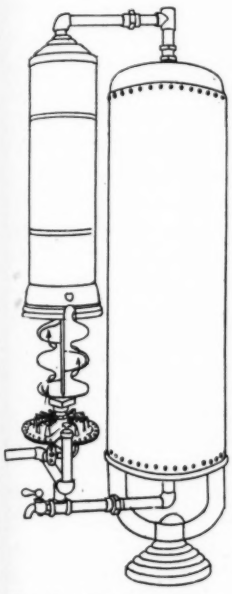


Fig. 17. Gas water heater for range boiler.

To fill just such requirements gas water heaters, similar to that shown in Fig. 17, were designed. Gas heaters of this description are usually formed either with a collection of drop tubes, a spiral coil or a special hollow casting of iron through which the water can flow, and absorb heat from the flame and hot gases applied to the outside of the casting. Whatever may be the interior construction of the water heater, it is provided on the outside with a casing to confine the hot gases in close proximity to the hollow casting, so the water will have the benefit of all the available heat. The heater shown in Fig. 17 is made of cast iron, and in the illustration the outer casing is shown raised to the top so as to expose the inner casting through which the water flows. This casting is placed directly above a gas burner so the bottom enlargement of the casting will receive the direct heat from the flames while the hot gases pass over and around the other enlargements, as indicated by the arrows. When the casing is down in place the burner is not accessible, consequently a pilot light proves convenient for igniting the gas when the water is to be heated. Naturally, on account of the great amount of gas the heater would consume, it is kept in operation only when hot water is required. A valve in the gas supply to the heater allows the supply to be so regulated that once the water in the tank is heated only enough heat need be supplied to keep the water at that temperature. It might seem needless to add that a Bunsen or atmospheric burner is the only kind suitable for such a heater.

Gas water heaters are placed in the kitchen alongside of the tanks to which they are connected. They could be placed in the basement, cellar or any other part of the house below the level of the boiler, but in that case there would be a greater loss of heat, the exact amount depending on the distance the heater was located away from the hot water tank. The best and most convenient place, therefore, to locate the heating is in the kitchen, as close as possible to the hot water tank. It may then be connected up in any approved way, so there will be a good circulation of water between the heater and the boiler. If desirable, the return pipe from the heater can be connected to the side tapping of the boiler. It is better practice, though, to extend the return pipe to the hot water pipe above the boiler, as shown in the illustration. By this means the hottest water in the entire system can be drawn from the hot water pipes when a faucet is opened. In some installations, instead of a separate connection to the gas water heater, the heater is connected to the return pipe from the coal range to the boiler. This is only done, however, when, in large installations, a large hot water tank out of proportion to the range and the waterback is used, and unless some auxiliary means were provided to help heat the water, instead of the waterback doing so, the cold water in the boiler would chill the waterback and spoil the range for cooking and baking purposes. In whatever way the heater is used, it must be remembered that the cold water pipe must be connected to the bottom of the apparatus, and the hot water pipe to the top of the apparatus, so

This tells about Gas Water Heaters and their Installation

*Previous installments in this series of articles were published March 7 and 21, April 4 and 18, May 2 and 16, July 11, August 15 and 29, October 3, 24 and 31, November 28 and December 25. These back numbers can be obtained for 10 cents a copy.

that as the water is heated in passing through the heater, it can follow the natural tendency to rise.

Further, it is better, when possible, to connect the heater to a hot water boiler, independent of other connections, and independent of the water-back in a coal range.

It is unnecessary to place valves in the connections to a gas water heater, as when there is no fire in the heater there will be little or no circulation through the apparatus. It is not only unnecessary to use valves, but it is absolutely unwise to do so; valves should never be placed in a hot water system when by any possibility they can do harm, and if the valves to a gas water heater were shut off sufficient pressure would be generated within the hollow castings to burst the heater, with perhaps disastrous results.

To be continued. **All rights of republication reserved.**

"Confidential." Here is Alex. Buchman, of the Glauber Brass Manufacturing Company, of Cleveland, O., with one of his able assistants. Photograph by our Mr. Winslow.

When Casey Took the Pledge

By Edwin Drood

"Did I ever tell you," asked Kelly of the drummer, as they sat down to luncheon together, "how it was that Casey went hot-foot to Father Dolan to sign the pledge?"

"No?" he continued, in response to a shake of the head. "Well, then, I'll let you into a little of Casey's private history, provided you let on you don't know anything about it. You see, he is strictly temperate now, and, so far as he is aware, nobody knows the reason but himself and the priest.

"It all happened this way," he resumed, with a twinkle in his eye. "I was sitting in the office one day, wondering how I was going to take care of all the work which was piling up, with good journeymen so scarce and everybody pushing me at the same time to finish their contracts, when a blue-eyed, red-headed little Irishman, with clothes looking the worse for wear, stepped briskly in and asked for work. Altogether I liked his appearance, although his clothes were dead against him, but I could not reconcile one part of his appearance with the rest of his make-up. Instead of the usual wiry figure which goes with the nervous temperament of an Irishman, particularly a red-headed one, he had a roly-poly, cherub-like figure, which was fairly bursting through his clothes, giving him a most comical appearance. He had a waist-line that would do justice to the keeper of a la' ger beer saloon, and in short was what you might call globular.

"So you want work, do you?" I asked, in order to gain time to think.

"That's what I'm looking for," he quietly replied.

"First-class man?" I asked suspiciously, for, having been singed by a number of lead butchers and no account skates, I am a little careful now who I put on and like to make sure of my man before I hire him.

"A-1," he replied promptly.

"Tell you what," said I, putting the matter squarely up to him, "I want men—good men, not botches—and want them badly. If you are an A-1 man it's you for me; but, before I put you on, you have to show me. I'm from Missouri, you know. Here's a piece of 1½-inch lead pipe," I continued, leading the way to the shop. "If you can make a good short bend on that and wipe a joint you're the man."

Casey did not disappoint me. I found he was one of the best workmen I had encountered during my forty years' experience in the business. And

when I came to know him better I learned that he was just as capable handling men and laying out work as he was with the tools. His one besetting sin, as he later confided to me, was an unquenchable thirst for liquor. He was a hopeless dipsomaniac; would go just so long without a drink, then would break out in a wild spree, and while the spell was upon him he would sell his soul for a drink. Ruggedly honest when he was sober, at other times, when the fit was upon him or when recovering from a spree, he would unhesitatingly steal liquor or the wherewithal to buy it.

Casey worked for me about two years, the periods between sprees growing shorter all the time, until something had to be done to break him or he would be of no use to me. I was in a quandary, not knowing just what to do, unless I discharged him, and that I hated to do, for in spite of his shortcomings I had grown to like him. Well, to make a long story short, I was in a brown study when in walked Doc Evans.

"Cheer up, old man," he laughed, slapping me on the back. "I never saw you looking so glum before. Cheer up, I say. What if you mother-in-law is coming to visit you? There is worse than that in store."

"Doc," I said, brightening up, "I was puzzled when you came in, but you have given me an idea. I am going to see what you can do for me," and I up and told him what my trouble was.

Well, we talked the matter over for an hour or more, then went to call on Father Dolan, and when we left everything was ready to put our plan in operation, to see what we could do for Casey.

The following Saturday night Father Dolan was at the shop when I paid off, and he joined Casey on his way home. What passed between them nobody knows, but the burden of Father Dolan's remarks was to take the pledge. You see, he was trying the value of suggestion, and when the right time came, he wanted Casey to think first of him and the pledge.

"If you keep on the way you have been going," he said to Casey, as they were about to part, it won't be long before you are seeing pink monkeys, with purple tails, lizards, snakes, hob-goblins and all the other hallucinations of a diseased imagination; and when that time comes I want you to think of Father Dolan and the pledge."

Monday morning Casey showed up about eight o'clock, but it required only half an eye to see that he was flying signals of distress. That was what I had expected and was mighty glad not to be disappointed.

"Get your tools, Casey," I called out to him, "I want you to go to Doctor Evans' house and fix the faucets on the lavatory in his private office." Casey got his tools, but his heart sank when he saw I was going to drive him to the job. You see, he had figured that he could stop on the way and get something to quench the liquid fire which was coursing through his veins, and moisten that dry sponge which had swollen until it filled his mouth. But I had no intention of giving him a chance, so when I set him down in front of the doctor's house, his whole system was crying out for something to drink, and his aching head had assumed such proportions that had he laid it down he never would have been able to rise again.

Casey went silently into the house, and I drove away. Once in the house his entire energy was devoted to getting a mouthful of liquor. "Mary," he said to the cook, with whom he was on friendly terms, "for the love of Heaven can't you give me a drink? My throat is parched, my coppers afire, and my head is nothing but one big ache."

"Shure," said Mary, who had been given her cue, and she drew him a glass of cold water.

Casey drank the water, if not gratefully, at least with temporary relief, then renewed the siege. "'Tis but poor comfort you give a sick man," he said ruefully, "handing him water when he is dying for a few drops of the o-be-joyful. Honest now, darlin', can't you give me just a few drops of something better?"

"Better, is it," she retorted, "'twould be better for you, Maurice Casey, if you never had anything better to drink. Better, indeed!" she muttered half aloud, "why, if you stuck to water you wouldn't be in a fair way for the bug ward in an inebriate asylum, as you are now. You better go see Father Dolan and sign the pledge."

"I know, I know, Mary," he replied thickly, "but just this once won't you help me? Just one drink and I'll do my work and go. You can't refuse a sick man who is dying for a drink, can you?"

"Well, if you put it that way," she said, "go down in the cellar and see what you can do. The doctor keeps the key to his wine cellar, but perhaps you can find a bottle within reach."

Down to the cellar went Casey, his hopes beating ragtime to his desires. He found the door to the wine cellar locked, but it was fastened with a chain which allowed the door to open three or four inches. Hope went down with a thump, however, when he saw that not only were all bottles and packages out of reach, but likewise out of sight. He stood longingly and despairingly peering in

through the slatted door, trying to make out different objects in the semi-gloom, when his eyes caught sight of something which made his heart beat fast and his nerves tingle, with anticipation. Standing on the floor, right alongside of the door was a square black bottle; and before the surprise of discovery had half passed away, Casey's hand reached through the partly opened doorway, and secured the prize. With nervous hands he drew the cork, as he advanced toward a gas jet, then held the bottle up to the light.

"Holy Moses," he yelled, with horror, dropping the bottle, which broke into a thousand pieces, and he bolted for the stairway. Then he cast one frightened look backward, and, yet, sure enough, there was a snake coiled up on the floor. "I've got them! I've got them!" he muttered, shaking with terror. "Father Dolan said I'd see snakes if I didn't stop drinking, and now— and now—."

With rapid strides and backward looks, to see that he was not followed, Casey put as many doors as he could between himself and that sinuous, crawling figure on the cellar-floor. Into the doctor's office he went, to finish his work and get out into the bright sunshine and reviving air. On the washstand stood a box, and as he reached for the box to put it out of the way, the top lifted off, and a yell fairly burst from Casey's nervous lips, when a pair of false teeth stood grinning in a horribly cannibalistic manner at him. Ordinarily store teeth are not calculated to cause a pleasant sensation when they are encountered suddenly, and in poor Casey's nervous condition, they almost sent him into hysterics. Mind what I'm telling you, now, Casey is no coward, and will stand up and face any mortal enemy, but, there is a streak of superstition grouted into his nature since a child, when he heard his elders tell of ghosts and the banshees' wail on the Old Sod. Added to this, he was shattered from drink, and had a horror of getting the D. T.'s, which had been threatened him time and again; so what he would have laughed at, at other times, drove him to the verge of distraction now.

As he placed the box containing the teeth on a work table at one side of the room, he noticed another box, covered with two pieces of colored glass. In his normal condition, he would not have been curious, but somehow, now, the temptation to raise the red and blue panes to see what was under, was irresistible. When he raised the glass, all color left his face; unable to move, he stood holding the glass and gazing spellbound at what was within.

"Darkness and Devils, they are Lizards!" at last his parched lips uttered. "A Lizard! a Lizard! half black and half white! Holy Mother!" he cried hoarsely a moment later. "Am I crazy, or is the reptile changing color?"

Casey was not crazy, but he was not far from it, as he watched the little chameleon change from half white and half black, until it was a dull slate color all over. While he watched with a horrible fascination, he saw one of the protruding eyes swinging in its socket like a searchlight, trying to locate some object, while the other eye looked straight ahead. When finally the moving eye rested on Casey with what to him was a baleful glare, he lost his nerve completely and rushed from the room.

"Lizards, snakes, teeth!" muttered poor Casey, "it will soon be the pink monkeys with purple tails," and he walked up and down the shade of the barn, trying to steady his overwrought nerves.

"Mother, Oh Mother, who'd ever thought I'd come to this. Crazy from drink, seeing snakes, lizards and other horrible things—Maurice Casey, the best thing you can do is swear off—it's the water wagon for you hereafter. Well," he sighed a moment later, "I must pack those faucets and get back to the shop."

Slowly and reluctantly Casey forced himself back to the house and into the doctor's office. Without looking toward the table where the teeth and chameleon were resting, he went direct to the wash basin, dropped on his knees before the door enclosing it, intending to shut off the water from the cocks. One glance inside, and for a moment his

An attractive corner in the handsome display room of Stone & Rennie, at 354 Pacific avenue, Santa Cruz, Cal. The owners of this establishment write: "We got the idea of our fixture display from your valued journal, 'Domestic Engineering,' which is read with much interest by all the boys in the shop."

heart stood still; then, gathering force, it sent the hot blood coursing through his veins like a mill race. Cold beads of perspiration began to stand out on his forehead, while his entire body became covered with goose flesh. Try as poor Casey would, his nerveless hands would not close the door, and unable to move with fright and horror he stood rooted to the spot, while a mummied, grewsome hand, which the doctor had been dissecting, seemed to reach forth in mocking friendship to clasp his own. Finally, his teeth began to chatter, and the shiver which passed over his body slammed the door to with a bang, thus shutting out the horrible sight.

"Great Caesar's Ghost!" muttered the bewildered Casey, staggering to his feet. "I must get out of this or I'll go mad, yes, mad as a hare. If I were to open that door again I'd faint, and I'll not open it—if the work is never done. Ah!" he continued a moment later, "I know what to do; I'll shut off the water at the tank."

Up the attic steps he bounded, two at a time, determined to make short work of the repairs. At the top of the stairs he paused in the darkness, trying to see his way. He had been there before, however, so knew just where to find the shut-off, and stepped briskly in the direction; one, two, three steps he took, when he collided with something hanging from the rafters which gave forth a rattling sound. For a moment he stood bewildered, struggling with the articulated skeleton, then with an unearthly yell, which rang in the servants' ears for weeks, he tore, hatless and coatless, down the stairs and out of the house, turning his steps in the direction of Father Dolan's residence.

The priest was just ushering out a visitor, when he saw a little round figure, wild-eyed, with red hair, standing on end, like the quills on a porcupine, come tearing down the street, touching only the high spots, and leaving a smoking streak in his wake.

"Father," yells Casey, bursting unceremoniously into the house, "quick, Father, I want to take the pledge. I've seen a ghost!"

"Ghost, nothing," said the priest, leading him into the library, "it's spirits that are troubling you."

The Englishman: "The sun never sets on British territory."

The American: "No; but the Goddess of Columbia did it twice, though."

First Writer: "How do you like this tobacco?"

Second Writer: "Awful! Smells like you're smoking transfers."

Plumbing System Installed in a Modern Office Building

The Westory Chambers is one of the most recently constructed office buildings in Washington, D. C., where it is located at the northeast corner of Fourteenth and F streets. We take pleasure in publishing herewith specifications for the plumbing and gas fitting of this structure, together with a sketch of the elevation or stack diagram of the plumbing system, as well as basement plan, showing sewers and plumbing layout. The plumbing system was installed by Hoben & Doyle, of Philadelphia, while Isadore Freund, of Washington, D. C., constructed the sewer to the building.

PLUMBING.

The plans are intended to show the general principles of arrangements merely, the details of construction and any lines of wastes, vents, supplies, etc., shown shall vary therefrom as circumstances may require and as the architect directs.

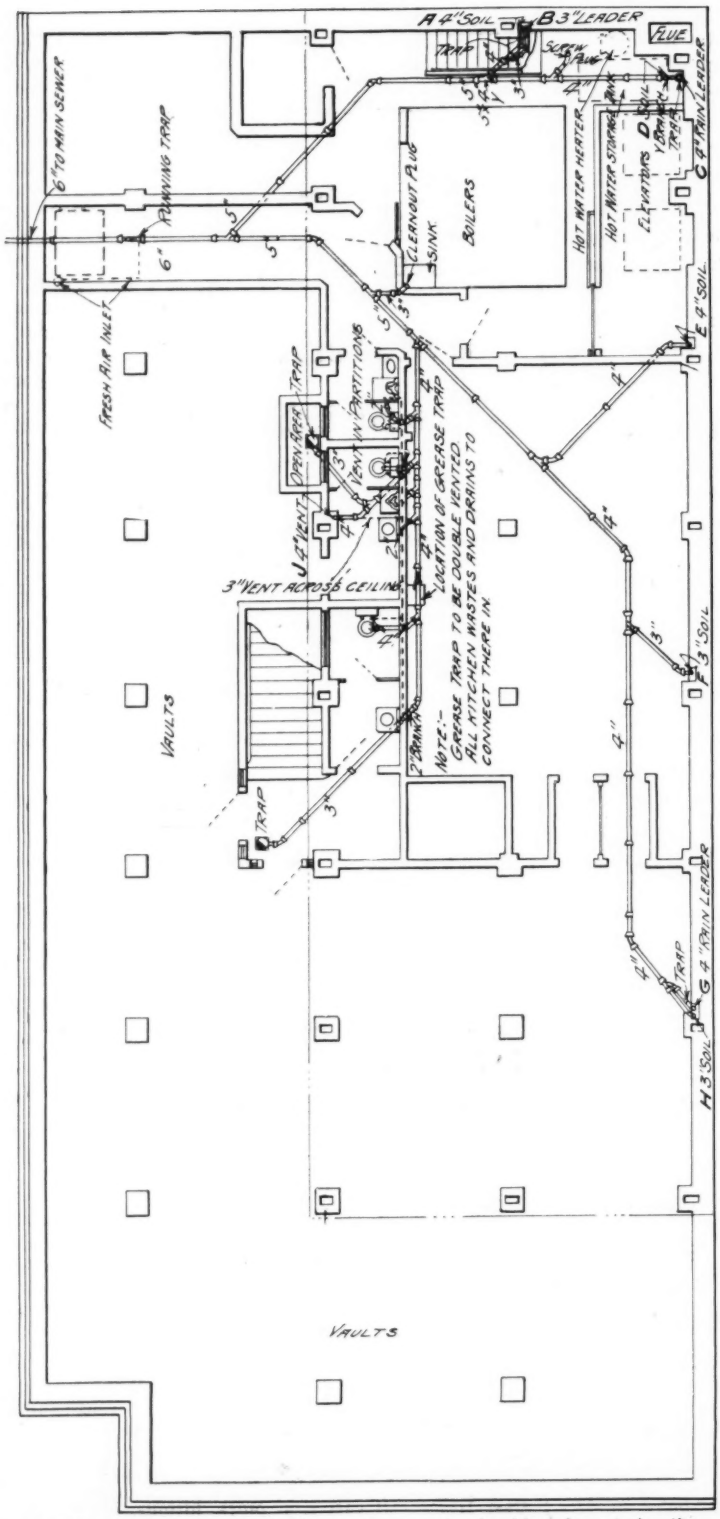
This specification is intended to provide for a complete and perfect system of water supply, plumbing, drainage, gas piping and other work herein specified, in conformity with the plans, and it is hereby understood and agreed by the plumber that anything, whether material or labor, even if not particularly mentioned in these specifications or shown on the drawings, but which may be necessary to complete the work according to the true intent and meaning of same, shall be furnished by him as a part of his contract, and without extra charge, the same as though herein specifically set forth, and all to be done to conform to the rules and regulations of the local plumbing department.

The plumber must do all the minor cutting, all excavating and refilling, paving, etc., and shall furnish to the floor contractor, cast iron thimbles to build in the floor for all of his pipes that pass through floors, where necessary.

The plumbing contractor will make all necessary and permanent waste and supply connections required by mason, steam heating, elevator and other contractors, as may be directed by the architects, and furnish a temporary water closet for workmen. At the completion of the work he will properly remove such temporary connections.

The plumbing contractor hereby guarantees all work done under his contract as to material, workmanship and operation for a period of one year from date of the completion of his contract, as shown by the date of the final certificate issued by the architect.

Cast Iron: All cast iron pipes, fittings, traps, etc., to be extra heavy, where underground, and extra heavy



Sketch showing basement plan, sewers and plumbing layout in the Westory Chambers, Washington, D. C.

above ground, and free from sand holes, splits and other defects, and of uniform weight and thickness.

Galvanized Wrought Iron Pipe: All cold and hot water supply piping, mains (except main supply) and tank connections to be galvanized wrought iron pipe, warranted fully up to standard in weight and thickness.

Painting and Covering of Pipe: Underground drains to be repainted after laying, and tested. All waste and soil piping, whether exposed or covered in chases, etc., will be well cleaned, then heavily painted with asphalt or graphite, or shellacked and given at least two good coats of lead paint when piping is exposed through prominent rooms or floors.

All cold water supplies to be covered with R. W. Lyle covering, one inch thick, where there is danger of frost or condensation, throughout the building, or as may be directed by the architects.

Lead: Short waste branches for fixtures, if of lead, will be "D" lead pipe, standard weights. Water closet bends to be nine pounds drawn lead. Lead water piping, if specified in any case for fixture branches, to be "AA" pipe of standard weight. Caulking lead is to be pure pig lead; no old lead to be used.

Exposed Supplies: All exposed supplies, traps, wastes, valves, etc., under and around fixtures, to be nickel-plated, with N. T. escutcheons, at wall or floor lines.

Connections: All joints in cast iron pipe to be properly lead calked, flush with hub. Joints between lead and iron pipe to be made with brass ferrules, calked into same and wiped to lead.

The joints between pipe, stacks and roof will be made water tight by special roof fittings and flashings, and sleeves of 20 ounce cold roller copper, extending 18 inches on all sides of the pipe and fitting under roof covering.

Supports: All pipe stacks to be supported at base by extra heavy hangers and each line by heavy pipe clamps, rests, etc., secured to floor beams, or leaded into masonry as directed, or supported on piers from foundation. Horizontal lines and branches to have

heavy iron pipe hangers clamped to iron beams, or supported on piers from foundation. The ordinary "pipe hook" will not be permitted.

Fittings, Etc.: All changes in direction of fixture connections, etc., to be made with Y branches and 45 degrees elbows. No short or close 90 degrees or other bends will be used, unless on special permission from the architects.

All sewers or drains and horizontal wastes and their branches must have a uniform grade of at least one-fourth inch per foot and as much more where practicable in each case.

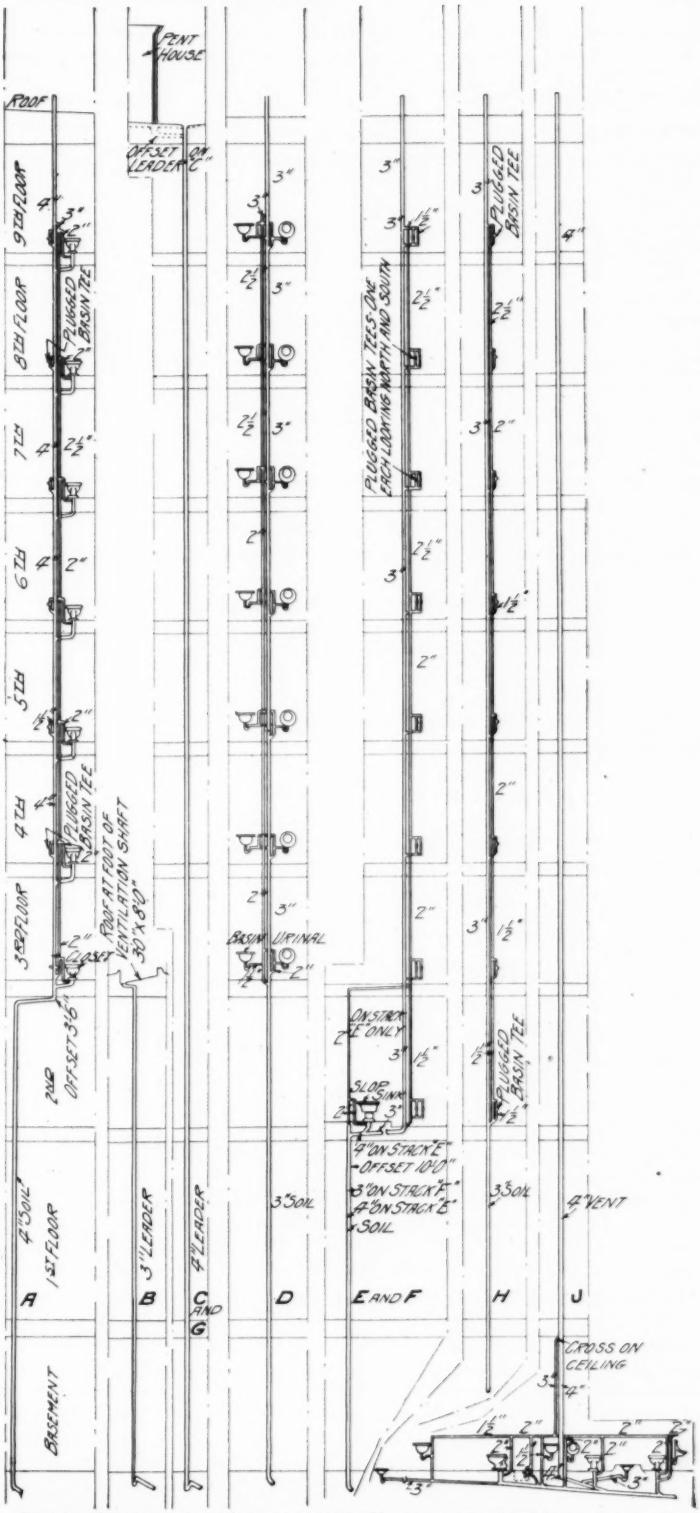
Drains and Leaders: Connect up with street sewer and run a six-inch extra heavy cast iron drain inside building, with main trap and fresh air inlet and dirt catcher to curb. The drain inside to be six inches and run full size, with branches to leader pipes. Leader pipes where shown to be screw joint 4-inch wrought iron, with deep seal leader traps and recessed fittings, pipes to extend and connect up with roof gutters where directed, and furnish galvanized iron baskets or screens at mouths of same.

Run 4-inch cast iron soil pipe line for main toilet rooms, and 3-inch lines for wash basins, full size through room and made water tight; also run all mains and branch vents from traps or fixtures of proper sizes and kinds, to conform to the rules and regulations of the departments governing same.

Sizes of branch wastes not less than the following to be used: 1½-inch to wash basins and sinks, 2-inch to urinals.

Connect up all areas and floor drains where shown, to drain through galvanized iron traps and deep seal S or P traps.

The lines as shown on plans are approximate only, both as to numbers and location, and before the walls and masonry are started the plumber must locate the different checks, if any; the openings in foundations and all other necessary information to all mechanics, before starting, and be responsible for same.



Sketch showing elevation or stack diagram of plumbing system in the Westory Chambers, Washington, D. C.

Run separate lines of wastes, vents and hot and cold supplies of proper sizes properly capped and plugged, for proposed fixtures where shown on plans, in offices, café and kitchen purposes.

Water Service: All water pipes and fitting for same, fixture branches and connections to be of standard galvanized wrought iron pipe. All valves to be brass, Jenkins Brothers' make, soft disk.

Valves to be put on each supply to each fixture, water closet and urinal tank and groups of fixtures, so as to shut them off independently.

All pipes to be carried in neat pipe hangers. All hangers to be secured to walls or beams before plaster work is done, and escutcheons fitted close in plaster of paris after wall is finished.

Each column of fixtures to have independent lines, with stop valves, drain-out valves and drips at base of each column.

All water supply pipes to be at least two inches removed from steam pipe.

All connections with tanks to be made with locknuts or bolted flanges, using sheet washers, unless otherwise specified.

All valves and stops on water supply pipes throughout the building to have neat brass tags with designating numbers stamped on each, to correspond with the water diagram to be supplied by the plumber in a neat frame.

The hot water generator to have valves on all pipes connecting with same. Also to have 1-inch sediment pipe emptying into sink.

The plumber shall excavate for and lay a 3-inch cast iron pipe, connecting with street water main, with as large ferrule as obtainable, and extend same inside foundation walls, and provide brass gate valves just inside. Connect this with 2-inch Gem or Union water meter, to be furnished by the plumber.

Extend the main full size and take branches from same with valves on each as follows:

2½-inch to suction tank. Suction tank branch to have two (2) 1½-inch branches, with 1½-inch Ford balance tank valves and balls of approved make. Three (3) 1-inch branches for sill-cocks where directed. 1½-inch branch to supply main toilet rooms. 1½-inch to hot water heater.

One-inch to engineer's sink, with hose bibb over same and any other branches that may be necessary for elevator service, machinery and steam plant needing water connections.

The cold supply system below the third floor and inclusive must be arranged and connected together with the necessary check and stop valves, that either the tank or street pressure can be used.

Hot Water Boiler and Heater: Provide and fit up complete, with hot and cold water connections, where directed, with drain out pipe to sink, a 200-gallon extra heavy galvanized iron hot water boiler, tested, and with safety valve, discharging into sink.

Provide and fit up complete a Mott No. 24 round Sunray Water Heater, or equal, set on proper foundations, with 7-inch smoke pipe to flue, 2½-inch galvanized iron flow and return pipes connected with boiler, and drain out cocks complete.

The hot water boiler is also to be connected up separately in water back or coil in steam boiler, with galvanized iron flow and return pipes of proper sizes and with drain out cock.

Hot Water Supply: Connect up to boiler and run a 2-inch galvanized iron supply, with branches to fixtures, same size as cold water.

The hot water system throughout to have return circulation to boiler with quick fall, and ¾-inch expansion pipe at least five feet over house tank.

Suction Tank: Provide and set in cellar a suction tank 250 gallon capacity, of ¼-inch iron, riveted at 1½-inch center to center, wrought iron cross tied in both directions and guaranteed from bulging, 2-inch by 2-inch angles riveted around top and bottom, with 2½-inch overflow, one inch below top, connecting with sink. Tank to be raised on iron standards and to have proper foundations, with wrought iron safe pan with 2-inch safe waste and overflow pipe and with 1½-inch emptying pipe and valve connecting with overflow pipe. Tank to have dust-proof cover, galvanized, faced beneath with 2′′x2′ scuttle, cover to have square ventilating openings, covered with fine wire gauze and corron drilling.

Six (6) inches above bottom of suction tank leave a 2½-inch threaded opening for suction to pump, with valve. All joints to be chipped and calked and made water tight, without the use of putty or paint. On completion paint all tanks with four coats of best red lead and oil.

House Tank: Provide and set where shown on plans one house service tank six feet six inches long, three feet six inches wide and six feet deep, as shown on plans, in penthouses, made similar in all respects to suction tank, thoroughly braced and cross tied to prevent bulging, with overflow, drip, trap and drain-out discharging on roof, and with brass clap trap on end.

The house and suction tanks shall be supported on 6-inch steel beams resting in pans, and shall run longitudinally, one under each edge of tank and others placed not more than 36 inches on centers. The pan for the suction and house tanks shall be made of ¼-inch metal, with angle irons on top edge, six inches deep, extending eight inches outside the tank lines on all sides.

A separate price to be given for furnishing an extra house tank 5′x5′x6′ deep, similar in all respects as above, this tank to be cross connected with regular tank, so that either may be used separately or together.

Pump: Furnish and fit up complete working order where directed a Quimby electric pump, with motor 500 gallon capacity per hour, with improved Ireland automatic switch, and cut-off, float and wiring from tank through coated iron pipe. 2-inch galvanized iron suction and 2-inch discharge to house tank or tanks.

Cold Water Service: Six inches above bottom of house tank take a 2-inch supply, with gate valve distributing down mains for each stack of fixtures, with stop valve on each.

The following size branches and down mains are to be provided for: 1¼-inch line to main lavatories and kitchen, 1¼-inch to hot water boiler, 1-inch to basin lines. As heretofore stated, all fixtures on third floor and below must be so arranged that either the tank or street pressure may be used for cold water.

Supply Branches: The following sizes shall be used for all lateral supply branches to fixtures, both hot and cold:

Main toilet rooms.....1¼"
Two to three basins..... ¾"
Sinks ..... ¾"
All single flush tanks.....½"
All single wash basins.....½"

On completion of the work the plumber shall fill all the tanks, turn on water to all of the fixtures and other appliances and leave everything clean and tidy and in perfect and complete working order.

Fire Lines: Six inches above bottom of house tanks take two 2½-inch galvanized iron supplies, with indicator valves, if two tanks are used, otherwise one supply; from this take one 2½-inch fire line, with gate and brass swinging check valve opening down. This pipe to be carried down through the building, thence to the cellar and up through the vault ceiling to street where directed, with polished brass twin couplings, caps and check valves.

Fixtures: The plumber at his own expense shall supply, set and connect in perfect working order the following fixtures:

Water Closets: The water closets are to be of the Hydric, plate 24 A, complete with N. P. flush pipe and wall guides complete.

Wash Basins: To be the Sanic 15"x19", set in countersunk Tennessee marble slabs, sizes as shown, backs and ends, and ends 12 inches high, set on N. P. brass brackets or legs, firmly secured; N. P. Sanic self-closing cocks for hot and cold water; N. P. supplies and Hydric traps, with vents complete.

Engineer's Sink: Engineer's sink in basement, to be galvanized iron, 22"x36", set on galvanized iron brackets, with back supplied with hot and cold water through ¾-inch hose bibb, plain brass 1½-inch Hydric trap with vent.

Urinals: To be the Improved Sanic Safety Urinals, with hardwood single-pull tanks, P1 19-A, N. P. flush, supply and wastes complete. Urinals to be set not more than 22 inches from top of lip to floor.

Marble: Except basin slabs, all the marble for plumbers' work, the urinals and water closet partitions to be supplied and set by the marble contractor, but the plumber must furnish him with all necessary measurements for cutting holes, etc., and he is to be responsible for same being correct.

Gas Fitting: Before the floors are laid, lay gas pipe throughout the building, of approved standard sizes, such as to supply all the burners at one time with a full head. No pipe to be less than ⅜-inch. Include all meter connections. Mains and branches to be properly graded. No run to form a trap. All angles and fittings to be galvanized.

Outlets to be where marked on plans or directed by the architects. No pipe to project more than one inch from finished wall or ceiling. Side outlets to be five feet three inches above floor, unless otherwise directed. Center all outlets accurately in ceiling or wall spaces, where it is the evident intention. Architects must be consulted as to the cutting of all fire proofing and walls. Cap all outlets and test in accordance with the local gas company regulations and prove same to be absolutely without leak and to the satisfaction of the gas company's inspectors.

Testing: All soil and waste and drain piping to be tested as required by the rules and regulations of the Washington city departments governing same before it is covered in or painted.

The Skiffington Patent on the Use of Air Pipe Lines in Vacuum Heating Expires

Letters patent (U. S.) No. 464,946, covering a system of steam heating, were granted to William P. Skiffington, of New York City, on December 8, 1891; the term of years for which this patent was granted consequently expired last week. As this patent covered several interesting features in the development of steam heating it may not be entirely amiss to recall some of these features as set forth in the patent specifications, which read in part as follows:

"This invention relates to means for creating, maintaining and controlling free and perfect circulation, in a heating system, of the heating fluid; and it consists, broadly, in the combination, with a heating system of an air-pipe additional to the supply and return pipes, and an exhauster for drawing air from the system through the said air-pipe.

"The invention further consists in the combination, with a heating system, of an air-pipe and an exhauster for drawing air from the system through said air-pipe and an automatic valve located at some suitable place in the said air-pipe for restricting or controlling the flow of air through the said pipe.

"In the accompanying drawings, Figure 1 is a sectional elevation of a building, showing radiators for heating the several rooms thereof, in which a single-pipe heating system is employed, and showing the additional air-pipe communicating at one end with the radiators and provided at the other end with an exhausting apparatus for drawing air through the air-pipe. Fig. 2 is a similar view, showing another arrangement of the invention, wherein each radiator is provided with a separate air-pipe leading to the exhausting apparatus, whereby each radiator can be controlled independently of the other.

"The improvement is shown as applied to what is commonly called a 'single-pipe heating system,' in which one and the same pipe serves as the supply-pipe to supply steam and also as the return-pipe to permit the escape or return of the water of condensation. The improvement, however, can be equally well applied to what is commonly called a 'double-pipe heating system,' in which there is a supply-pipe for supplying the steam to the heaters or radiators and a separate return-pipe for permitting the escape or return of the water of condensation. As these two systems of heating are well known, I have shown in the drawings connected herewith only one system, to-wit, the single-pipe system.

"In the drawings, A and B represent apartments to be heated, and C C' represent heaters or radiators of any suitable construction located in said apartments, respectively. A boiler D, of any approved form or

construction, is shown located in the cellar or any other convenient point, from which passes a pipe E, which extends to and communicates with the several radiators, the inlet of each radiator being controlled by any suitable form of valve, as shown at F, the parts already shown thus constituting a single-pipe heating system, in which the heating agent is supplied to the radiators and the water of condensation returned therefrom to the boiler through the same pipe E. G is an air-pipe, which communicates with a series of radiators, as shown in Fig. 1, or with a single radiator, as shown in Fig. 2, and which extends therefrom to the boiler-room or other suitable place in the building, where it is connected with a suitable exhauster, by means of which a vacuum or

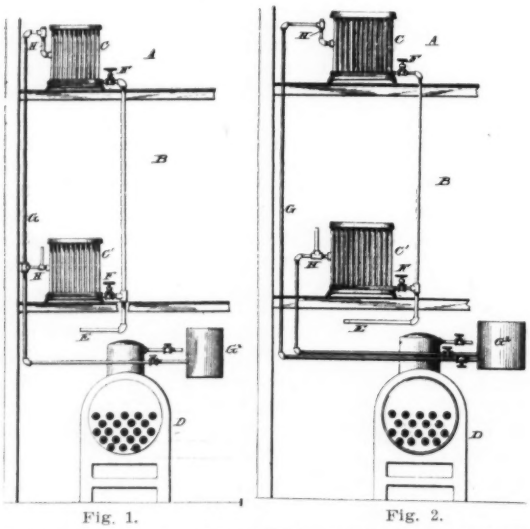


Fig. 1. Fig. 2.

Drawings illustrating W. P. Skiffington's system of steam heating. Patented December 8, 1891.

a partial vacuum may be obtained in said air-pipe. In the best and most complete form of the invention the air-pipe G is connected with the radiator or heating apparatus at a place above that part of the radiator where the water of condensation ordinarily collects, and the said air-pipe is provided with an automatic air-valve H, which acts to open for the passage of the air, but to close so as to prevent the passage of the heating agent, this operation being effected by the effect of heat and cold respectively, upon the said valve. As a result of this construction, the water of condensation does not get into the air-pipe, but escapes through the pipe E, or in a double heating system escapes through the return-pipe of that system. The automatic valve opens when the heating apparatus is cold, as it is when the apparatus is first started or when any considerable quantity of air collects in the heater, and thus permits the exhausting or withdrawal from the heater of such air both when the heating system is first put into operation and at any time while it is in operation and when for some reason air has collected in the heater. G^2 is an exhauster or exhausting apparatus connected with the air pipe C in such a way as to enable air to be exhausted from or drawn out of the heating apparatus through the said air-pipe. This exhausting apparatus may be made in any suitable form. For example, it may be an exhauster connected with the boiler, or it may be a pump or any other device which shall be found most convenient or which the nature of the case may require, and it may be connected with any part of the air-pipe.

"The advantages of the invention may however be utilized to some extent by connecting the air-pipe to any part of the heating apparatus, provided that if the air-pipe is connected with the return-pipe it is so connected above the point where the water of condensation collects that escapes down through the said return-pipe; and the advantages of my invention may also be secured to some extent by an air-pipe in which no valve is employed, or in which some other form of valve is used in place of the automatic valve, or any other suitable means for controlling the passage of air through the air-pipe. Where each radiator or heater is connected with the exhauster by a separate air-pipe, each air-pipe may be provided with a suitable stop-cock or valve near the exhauster, whereby the engineer or attendant may control the heat of each independently of the other; or where a single air-pipe is used for a series of heaters a valve may be placed upon such air-pipe near the exhauster, whereby the entire system may be controlled in like manner.

"The operation of the system is as follows: When it is desired to supply the heating agent, the valves in the supply-pipe are turned on and the valve or valves on the air pipe or pipes near the exhauster are opened, the exhauster being in operation, as a result of which the air is drawn from the radiators or heaters, thereby removing the resistance to the heating agent otherwise caused and permitting a free and complete circulation of the heating agent and preventing air from being suddenly compressed by the action of the heating agent and then expanding against the same to force the same backward and thereby preventing the usual hammering heretofore so objectionable."

Seven claims were made for this invention the most notable being as follows:

" In combination with a heating system consisting of radiators and connecting supply and return pipes, a suitable source of heat, an air-pipe in addition to the supply and return pipes, having branches connecting it with each radiator, an automatic air-valve connected with each of the branches of said air-pipe, and an exhauster for drawing air from the system through said air-pipe, substantially as set forth."

Questions and Answers

WHERE PLUMBING LAWS ARE IN FORCE.

Washington, D. C.—To the Editor of "Domestic Engineering." Sir: Having noticed in a recent issue of your valuable journal a request for information about the number of states having plumbing laws requiring plumbers to be examined and licensed, I take pleasure in stating that such laws can be found in the Tenth Special Report of the Commissioners of Labor, 1904, entitled "Labor Laws," which shows that they are in force in California, Colorado, District of Colum-

bia, Illinois, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, Oregon, Pennsylvania, Porto Rico, Texas, Virginia, Washington and Wisconsin. Plumbing laws are also in force in the states of Maine and Minnesota, and they were published in the Bulletin of the Bureau of Labor, May 1906, No. 64.

Yours very truly,

Henry B. Davis,

Inspector of Plumbing, District of Columbia; Chairman of the Board of Directors of American Society of Inspectors of Plumbing and Sanitary Engineers.

Wholesale News

The Rowe Sanitary Lavatory Company has been incorporated at Phoenix, Ariz., with a capital stock of $25,000.

The Pittsburg Supply Company, of Fort Smith, Ark., has been incorporated with a capital of $50,000, to deal in plumbing supplies and lighting appliances. The officers of the new company are E. C. Lichty, president; J. B. Weatherton, vice-president; P. C. Hendricks, secretary and treasurer.

The Atlas Torch and Brass Company, of New York City, has been incorporated with a capital of $10,000 to manufacture plumbers' torches and tools. The incorporators are Aaron Davidson, 1151 Park avenue; Louis Schemnitz, 190 Brown place; Julius Bramstein, 29 West 114th street, all of New York City.

W. Ralph Hughes, of Pittsburg, Pa., formerly salesman for the Standard Sanitary Manufacturing Company and also in charge of the showroom of the Standard Manufacturing Company, has been engaged to take full charge of the sales of the Pittsburg Sanitary Manufacturing Company, with offices in the Bailey-Farrell building, Third and Ross streets, Pittsburg. Mr. Hughes is well known to the plumbing trade all over that part of the country. He will personally call on the plumbing trade in the eastern half of the country, and from time to time will establish agencies and sales representatives for the company.

GROWTH IN EXPORTS OF MANUFACTURES.

Manufactures exported from the United States in the fiscal year 1908 aggregated three-quarters of a billion dollars, a larger total than in any preceding year. Of this grand total practically one-half went to Europe, the share sent to that part of the world being unusually large, and the total value larger than ever before. The annual report of the chief of the Bureau of Statistics, Department of Commerce and Labor, just made public, shows that the value of American manufactures exported to Europe in the fiscal year 1908 was, in round terms, 368 million dollars, against 355 millions in 1907, 318 millions in 1906, 283 millions in 1905, 272 millions in 1900 and 111 millions in 1895. Rapid as is the growth in exports of manufactures, the share which Europe takes thereof has been in recent years apparently increasing. Of the manufactures exported from the United States during the past four years 46.3 per cent went to Europe in 1905, 46.4 per cent in 1906, 47.9 per cent in 1907 and 49 per cent in 1908. Naturally, the most important of the manufactures exported to Europe were those for further use in manufacturing, such as copper, chiefly pigs, ingots and bars, 97 million dollars; leather and manufactures thereof, 26 millions; wood and manufactures, chiefly lumber, 38 millions, and manufactures of iron and steel, of which bars and rods of steel and other partly manufactured materials form a considerable percentage, 47 million dollars. Other important manufactures exported to Europe include refined mineral oils, 55 million dollars; naval stores, 17 millions; agricultural implements, 14 millions, and instruments and apparatus for scientific purposes, nearly four millions.

North America came second in the order of magnitude of exports of manufactures to the grand divisions, the value of manufactures exported to all North America being 189 million dollars, of which the principal items were manufactures of iron and steel, 72 million dollars; manufactures of wood (including lumber in this term), 21 millions; manufactures of leather, 9½ millions; manufactures of cotton, 10 millions; carriages and cars, 8½ millions; chemicals, drugs and dyes, six

"An Echo from Southland." This is an interesting snapshot of R. Dee Pierce, secretary-treasurer of M. Glauber & Co., of New York City, taken at Gainesville, Ga., last month. His train has become stuck in the sugar cane and he is seen here camping out awaiting developments.

millions; refined mineral oils, four millions; paper and manufactures thereof, four millions; instruments and apparatus for scientific purposes, 3½ millions, and agricultural implements, 2½ millions.

To South America the exports of manufactures for the year were, in round terms, 72 million dollars, of which 22 million dollars was in manufactures of iron and steel, nine millions refined mineral oil, 2¾ millions cotton manufactures, 4½ millions carriages and cars, 5¼ millions agricultural implements and 10 millions wood manufactures.

To Asia the total value of manufactures exported during the year was 72 million dollars, 23 million dollars being the value of refined mineral oils, 25 millions manufactures of iron and steel, 5 millions cotton manufactures, 3½ millions copper, three millions carriages, cars, etc.; 2 millions tobacco manufactures and 1¼ millions wood manufactures.

Of the 40 million dollars' worth of manufactures exported to Oceania, 14 millions was the value of iron and steel manufactures, four millions mineral oils, refined, four millions manufactures of wood, two millions leather and manufactures thereof and 2¼ millions cotton manufactures.

Of the 10 millions of exports of manufactures to Africa, iron and steel showed a total of nearly three million dollars, refined mineral oils 2½ millions and lumber one and one-third millions, the remainder being miscellaneous articles.

Manufactures formed in the fiscal year 1908, 28.95 per cent of the total exports to Europe, 60.26 per cent of those to North America, 86.42 per cent of those to South America, 70.82 per cent of those to Asia, 86.66 per cent of those to Oceania and 49.24 per cent of those to Africa.

Metal Market

New York Metal Market, December 15.

Copper, Prime Lake	$14.50
Copper, Lake, Arsenical brands	14.50
Copper, Electrolytic	14.25
Antimony, Cookson's	8.12½
Lead	4.25
Straits Tin	29.15
Spelter	5.15

Chicago Iron Market, December 17.

Southern, No. 2 Foundry	$17.35-17.85
Lake Superior Charcoal	19.50-20.00
Lake Superior Coke Iron, No. 2 Foundry	17.00-17.50

December 17, 1908:

Foundry iron was the same price as the week previous
$5 less per ton than the year previous
Copper was ½c more a lb. than the month previous
¼c more a lb. than the year previous

Cleveland, O.—Eastern furnace interests have purchased a large tonnage of foreign ore for 1909 delivery, says The Iron Trade Review. Most of this ore will come from Spain, but some will be shipped from Nova Scotia. The purchases amount to about 600,000 tons of foreign ore, and there has also been considerable trading in local ores in the east, consumers figuring that they can get foreign and local ores at lower prices than Lake Superior ores can be delivered. Sales of pig iron have been moderate, including 15,000 tons of basic for the Philadelphia district.

Personal

G. L. Adams, of the plumbing firm of H. B. Adams & Sons, of Oswego, N. Y., is recovering from an attack of typhoid fever.

Jas. M. Teahen, of the W. J. Scully Manufacturing Company, of Detroit, was in Chicago in the early part of this week and called on some of his friends in the trade.

D. B. Hapgood, who was recently appointed plumbing inspector at Pensacola, Fla., by the city council, has just assumed his new duties. He is the first one to hold that position in Pensacola.

David Waters, of the supply house of Waters & Miller, Brooklyn, N. Y., is receiving congratulations from a host of friends on the arrival of a very pleasing Christmas present. It's a boy, and he has been christened Paul.

The popular Texas plumber, Mr. West, of the firm of West & Gutzeit, at San Antonio, Tex., recently celebrated his twenty-fifth wedding anniversary. A large circle of friends attended the event, among these R. Dee Pierce, secretary-treasurer of M. Glauber & Co., New York City.

E. J. Ryan, of Danville, Ill., was a visitor to the Chicago trade this week. Some of his friends persuaded him to remain a day longer than he planned and attend the North and West Side Master Plumbers' ball, and he expressed himself as having enjoyed every minute of the pleasant affair.

John R. Alpine, of Chicago, president of the United Association of Journeymen Plumbers, Gasfitters, Steamfitters and Steamfitters' Helpers, was this week in Pueblo, Colo., inspecting the Fairmount sanitorium, which the organization is planning to purchase and use as a national home. Mr. Alpine also secured statistics in regard to the climate, health and general sanitary condition of Pueblo.

Obituary

Warren N. Reigel, secretary of the Penn Engineering Company, of Philadelphia, Pa., passed on at his home in that city on Wednesday evening, December 9, from heart failure. Mr. Reigel had been connected with the Penn Engineering Company since its incorporation in 1894, and he served in the capacity of secretary for the last ten years. He had a wide circle of friends in the trade, who will regret to hear of his departure.

Fletcher W. Rockwell, first vice-president of the National Lead Company and manager of its Chicago house, passed on at his residence in this city on Saturday afternoon, December 12, in his 66th year. He was born in New York state in 1843, and served with the union army in the civil war. At its close he settled in St. Louis. Mr. Rockwell was a resident of Chicago for the last fifteen years, and at the time of his death was a member of the Union League club and director of the Midlothian club. Funeral services were

held at the family residence, 5136 Washington avenue, on Monday afternoon, and the remains were taken to St. Louis for burial.

Edward F. C. Young, president of the Joseph Dixon Crucible Company, of Jersey City, N. J., passed on at his home in that city on Sunday, December 6. He had not been in good health for two years, but was still able to attend to business until six weeks ago when he had to remain indoors. Edward Faitoute Condict Young was born near Morristown, N. J., on January 25, 1835, and started his business career in 1852 as clerk in the Hudson County bank in Jersey City. By close attention to his work he received promotion after promotion, and in 1865 was appointed assistant cashier of the First National Bank of Jersey City. In 1879 he was elected president of the institution, a post he held till his death. Later he also became president of the Joseph Dixon Crucible Company which he soon made one of the most successful industries in the state of New Jersey. He was also president of other institutions such as Hudson County Gas Company, North Jersey Land Company, Consolidated Traction Company and Pavonia Trust Company, and a director of eight other financial institutions. During the years of his greatest activity he is said to have been connected with more enterprises than any other individual in New Jersey, and his name became foremost in the financial and commercial affairs of the state. He leaves a widow, one son and one daughter.

The late Edw. F. C. Young, President of the Joseph Dixon Crucible Co., Jersey City.

Association News

Date of Annual Convention of the Illinois State Association of Master Plumbers Announced.

Chicago, Ill.—The next annual convention of the Illinois State Association of Master Plumbers **will be held in Peoria,** Ill., on Wednesday and Thursday, **January 20 and 21, 1909.** It is expected that this meeting will be even better attended than has been the case in former years, owing to the fact that members of the organization are taking more interest in association matters than heretofore. The past year under President Wm. J. Lang's administration has been one of great progress in the association, in spite of the fact that the financial flurry naturally was an obstacle to a great extent, but which was successfully overcome. The growth in membership has also been phenomenal; it came very near being as large as the preceding year, and such a favorable showing is the more remarkable at the present time because the field for growth in this direction is becoming more limited for every year that passes. At the meeting in Peoria it is planned to pay more attention to the social features than has formerly been the case. A banquet will thus be given in honor of the ladies who accompany their husbands to the convention.

Fifth Annual Reception and Ball of the Chicago North and West Side Master Plumbers' Pleasure Club.

Chicago, Ill.—The event which so many master plumbers and their families on the North and West Side in this city have been looking forward to for a long time with pleasurable anticipation passed into history on Wednesday evening, December 16, when the North and West Side Master Plumbers' Pleasure Club gave its fifth annual reception and ball at the Northwest Hall on West North avenue, near North Western avenue. Though the weather was not exactly all that could be desired for an event of this kind, (it was rainy and windy), quite a large number of pleasure-seeking master plumbers and their families were on hand a few minutes after the doors to the attractive hall were thrown open sometime after eight o'clock. Among those early on the scene were Peter Feltman, the genial financial secretary of the organization, who saw to it that no one entered the festal hall without first producing a neat piece of pasteboard with the proper inscription. E. J. Benning, chairman of the arrangement committee, was also in the vanguard, with his excellent corps of assistants, consisting of Chas. C. Breyer, E. C. Wagner, Joseph Scheuer and Col. Fred J. Wagner. The arrangements in the hall, such as the decorations with palms, ferns and other live flowers, came in for a final scrutinizing view and everything was declared to be in fine shape for the pleasant event. The excellent orchestra, whose services had been secured for the evening, was soon in its place and the stream of guests was by this time of very large dimensions, so it did not take very long before the hall was filled comfortably. After a few preliminary dances for the benefit of those whose tripping feet were too eager to await the regular order of the program, the grand march was announced about half-past nine o'clock. Col. Fred J. Wagner acted as master of ceremonies in his usual happy manner, and he was most ably assisted by Jos. Scheuer. The stately procession was led by Wm. F. J. Lutz, president of the club, and Mrs. Lutz; A. J. Fisher, vice-president, and Miss Fisher; both these ladies carried large bouquets of flowers. Then followed Mr. and Mrs. Charles A. Manthie, Mr. and Mrs. E. C. Wagner, Mr. and Mrs. Chas. C. Breyer, Mr. and Mrs. D. J. Hickey, Mr. and Mrs. Chas. J. Herbert, Mr. and Mrs. P. J. Foley, Mr. and Mrs. Henry Breyer, Jos. Scheuer and Mrs. Oscar Bird, Mr. and Mrs. Robt. Liss, Mr. and Mrs. F. J. Luettig and more than fifty other couples. The sight of so many well-dressed ladies and gentlemen in the well-lighted and handsomely decorated hall, both in the grand march and in the following dances, such as waltzes and two-steps, was a most attractive one, and one that will long remain a pleasant memory with those who were fortunate enough to see it.

The dancing was kept up till early the next morning and the waiters were in evidence throughout the entire affair, serving refreshments free of charge at the beck

and call of anyone inside the festal portals, making it an absolute solid comfort to be in attendance.

Among the many master plumbers present, most of them with their families, and not already mentioned were the following: Wm. J. Lang, president of the Illinois State Association of Master Plumbers; C. J. Herbert, member of the Board of Directors of the National Association of Master Plumbers; C. T. Byrne, C. J. Stein, William Redieske, W. G. Wood, C. A. Dreier, J. A. Salmon, L. A. Claussen, Frank J. Ruh, F. G. Werdell, A. C. Petersen, Wm. F. Knaus, G. Franklin, L. Nelson, Fred Grosch, L. J. Keefe, Paul Jacoby, L. H. Koepke, J. Kiessling, Hugo G. Schoessling, all of Chicago.

Among out-of-town master plumbers who honored the occasion with their presence were: E. J. Ryan, of Danville, Ill.; John McKay, of Winnetka; W. J. Hilliard, of Elmhurst; F. J. Luettig, of Glencoe; Chas. Beck, Parks Brothers, J. J. Cahill, M. L. O'Malia, all of Evanston.

The supply trade was represented by Oscar Meuser, of the Wolverine Brass Works; Alfred Jones, of the L. Wolff Manufacturing Company; Geo. W. Churchill, of Lausten Lead Works; C. E. Stringer and A. E. Stringer, of the Republic Manufacturing Company, and Thomas Connelly, of sewer pipe fame. Others in attendance were: Peter M. Munn, assistant secretary of the Chicago Master Plumbers' Association, and Thomas Grein, of the city sewer department.

That this social event was such an unusually pleasant affair was due to the careful planning and well-directed work on the part of the arrangement committee, which was composed of E. J. Benning, Peter Feltman, Chas. C. Breyer, E. C. Wagner, Jos. Scheuer and Fred J. Wagner.

Annual Ball of Manhattan Master Plumbers' Association.

New York, N. Y.—The annual entertainment and ball of the Manhattan branch of the New York City Association of Master Plumbers was held on Wednesday evening, December 9, at the Lexington Opera House on Fifty-eighth street. To say it was a success in every particular is putting it rather mildly. It was an affair such as the association is in the habit of giving, with nothing but enjoyment for everyone, and goodfellowship everywhere in evidence. Long before the "ninth" had arrived Tommy Cochrane started to deluge the members with announcements and kept at it with a fresh creation in literature and a masterpiece of the printers' art twice a week until the last day.

A young army of decorators was kept busy at the hall for days, and when the doors were thrown open for the reception of the plumbers and their guests the place presented a fairyland-like appearance, with gorgeous white and gold streamers suspended from the center of the ceiling and the boxes, and garlands of ferns and roses everywhere. The "Wait a minute" banner of the association was given a conspicuous place above the stage.

The vaudeville entertainment held the audience in laughter for several hours. The program was made up of a selection of stars from the New York theaters, such as Willy Zimmerman, May Ward, etc. The morriscope closed the performance, and then the seats were removed to make room for the dancers.

President James P. Knight lead the grand entree march, with Mrs. Knight, and then followed in rapid succession some twenty dances by Usher's orchestra and as many selections by the 71st Regiment band under the direction of Lambert E. Eben.

Up in the boxes could be seen the celebrities with their families, the ladies, gloriously attired, adding splendor to the scene. The café attracted the attention of many between dances, and the aproned guards were kept busy supplying thirst quenchers for the jolly crowd.

That redoubtable envoy of ninth avenue, Hon. Frank Brockett, in company with D. D. O'Brien, LL. D., and A. T. Mesereau (just plain), graced the occasion and kept himself busy contracting for dances with the fair ones. When not on the floor he could be found in the café dispensing hospitality to a host of friends until the cashier threw down his pencil and screamed for an adding machine.

The chairmen of and the gentlemen composing the different committees are to be congratulated upon the excellent manner in which every detail of the evening's program was carried out.

Never before in the annals of the association has the trade responded so generously in point of numbers. Every branch of the trade was well represented, including the manufacturing and supply men, the different city departments, and even from Newark, N. J., came A. Seldon Walker, member of the national executive board, to represent the Jersey association. William Eierman, T. F. McEnaney, S. J. Corcoran, Tom O'Brien, William Brown and others did the honors for the Brooklyn association, while from the Bronx were noticed Fred Weber, Joe Theiss and W. J. Flynn.

Everyone present voted the ball a grand success, with a unanimous stamp of approval on the efforts of the arrangement committee, which was composed of T. A. Hill, chairman; T. J. Cochrane, Jr., secretary; I. J. Brown, treasurer; T. J. Tuomey, sergeant-at-arms; Jno. L. Knight, Jacob Schwartz, B. F. Donohoe, Herbert A. Treat, T. J. Cummins, John Smith and Jas. P. Knight.

Chicago, Ill.—The Chicago Master Plumbers' Association will hold its annual meeting on Saturday evening, January 9, 1909, in its hall in the Schiller building on Randolph street. Election of officers and other matters of importance will come before the meeting, wherefore every member is earnestly requested to be present. The meeting will be followed by the excellent German lunch which has now become an annual social event so attractive that no one will like to miss it. A vaudeville program by high grade artists will wind up the meeting.

CONVENTION DATES.

January 19-21, 1909.—Fifteenth annual meeting of the **American Society of Heating and Ventilating Engineers,** in New York City.

January 20 and 21, 1909.—Annual convention of the **Illinois State Association of Master Plumbers,** in Peoria, Ill.

June 8-12, 1909.—Twenty-ninth annual convention of the **American Water Works Association,** in Milwaukee, Wis.

Plumbing Legislation

Grand Rapids, Mich.—While the new plumbing rules which have been prepared by the board of plumbing examiners contain a provision requiring all gas water heaters to be supplied with an outside vent to prevent the possibility of accident it is possible that this rule may be strengthened by an ordinance. Plumbing Inspector Griffen has stated from the first that an ordinance was necessary, but the board of health took no action. Now that another fatality has been narrowly averted in this city some of the aldermen are expected to urge the passage of the new law, and a resolution to this effect may be introduced at the next meeting of the city council.

Washington, D. C.—An amendment has been made to the plumbing regulations of the District of Columbia by the commissioners upon the recommendation of Inspector of Plumbing Henry B. Davis. The first five lines of Section 91 have been canceled and the following inserted in lieu thereof: "Each trap shall be placed as near its fixture as possible. For the purpose of obtaining a directly rising vent from a vertical waste line a fixture trap directly under a small fixture may be placed not farther than 12 times the internal diameter of the horizontal waste, from the vertical stack waste, measured between the center of the crown of the trap and the center of the vertical waste." The balance of the section is unchanged.

Dallas, Tex.—The new plumbing ordinance which has just been passed by the municipal commission is a voluminous document, covering nearly every detail of the plumbing business. The ordinance was drawn by Jacob Boll, the city plumbing inspector, who devoted several months to its preparation. Commenting on the new ordinance Mr. Boll said: "I think it will work several beneficial changes in the plumbing business in this city. We have been working under the old ordinance of 1891 and lots of the material considered good at that time is now out of date. They won't be able to use rotten material now. The people have been paying in some instances for black wrought iron vents and they are worthless, getting stopped up in six months with scale. Under the present ordinance the people may be assured that their plumbing work will be done right."

Washington, D. C.—The Bureau of Chemistry of the United States Department of Agriculture has made their report on their experiments connected with the gas water heater which caused the deaths of three persons in this city about a month ago, supposedly by carbon monoxide, a deadly gas caused by improper or insufficient combustion. The results of the experiments will probably be a strong factor in securing the adoption of the amendment to the gas fitting regulations, as recommended by Henry B. Davis, chief inspector of plumbing, shortly after the triple tragedy. If the amendment is made as desired every gas hot water heater installed here will be without a pilot light, and the door must therefore be opened to light the gas, and the heater must be provided with a flue to the outer air. All of these requirements were recommended by the bureau. The report also states that in a test of this same heater, "with a constant stream of cold water passing through the coils the evolution of carbon monoxide was greatly increased, so that the apparatus was much more dangerous. (A condition such as this might arise when a housewife was drawing water from the hot water spigot while the gas boiler was turned on.)"

The Great Northwest

Eau Claire, Wis.—Plumbing in the second ward school will be done by the Heidman Plumbing Company at the price of $5,750.

Racine, Wis.—The Thomas Heating Company will install a new steam heating plant in the Racine county poor and insane institution at the price of $1,925.

Neenah, Wis.—William Wieland and August Senn have formed a partnership to conduct a plumbing and heating business under the name of Central Iron Works.

Sparta, Wis.—The Monroe county board is considering the advisibility of installing a new central heating plant at the county poor and insane institution in this town.

Neenah, Wis.—C. W. Nelson has been awarded the contract for the heating and plumbing in the new Chicago and Northwestern freight and passenger depots in this city.

Milwaukee, Wis.—W. H. Halsey, president of the National Association of Master Plumbers, has been awarded the plumbing contract on the $500,000 St.

Who's Who in Britain—X

Dr. Robert Crawford has long been a leading authority on public health questions in England. He was for many years chairman of the Health Committee of the Glasgow corporation, and it was largely owing to his efforts that the national registration of plumbers was introduced by the Worshipful Company of Plumbers.

Mary's hospital now being erected in Milwaukee. While the contract price is not divulged, it is conceded that the job is the best of the year in Milwaukee.

Racine, Wis.—The Albert Brunk Plumbing Company has been incorporated with a capital of $2,500. The incorporators are Albert Brunk, Katherine Brunk and Martin J. Gillen.

Milwaukee, Wis.—Plumbing contracts will soon be awarded on the new and elaborate flats which will be erected by Patrick Cudahy, the well known packer, at Mason street and Juneau place. Nearly eighty bathrooms are to be installed.

Notes from the West

St. Joseph, Mo.—The C. F. Rock Plumbing Company, of this city, has secured the contract for the installation of the plumbing system in the new Robidoux school, at Tenth and Edmond streets. The consideration is $4,970.

St. Louis, Mo.—H. T. Kilpatrick, of 1214 Pine street, has secured the contracts for the plumbing in the sixteen-story Empire office building and in the Chamber of Commerce building, both in Birmingham, Ala.

St. Louis, Mo.—Prospects for building operations in this city are exceedingly bright for the coming year, several large contracts being nearly ready to start work upon, such as the new $1,000,000 city insane asylum, a new $1,500,000 public library, a $900,000 addition to the new City Hospital, a new $3,000,000 jail and Municipal Court building, a new postoffice and three or four public comfort stations.

Pacific Coast

Mill Valley, Cal.—The S. M. Burt Company has disposed of its plumbing business to Muntz & Shore.

Woodland, Cal.—The plumbing firm of H. Kuhn & Son has been succeeded in business by the Stevens Construction Company.

Portland, Ore.—A fire recently did damage to the extent of $1,000 to the plumbing supplies establishment of M. Bard & Son.

Los Angeles, Cal.—Building conditions are rapidly improving here and the records of building permits show a gain last month over October.

San Francisco, Cal.—William S. Snook & Son have secured the contract for installing the plumbing in the new Y. M. C. A. building, now in course of erection at the corner of Golden Gate avenue and Leavenworth street. Showers, baths and a large swimming pool will be installed in connection with the gymnasium.

San Francisco, Cal.—Building operations in this city have not been going ahead as rapidly of late as was expected in the fall by the sanguine ones. Among building men talk was current that as soon as the election was over there would be a big revival in building lines, but this revival has not as yet made its appearance. Instead building contracts for the month of November show a material decline from those of the preceding months, and the same may be said of building permits. At the same time it is noted that everyone seems to be well employed. Architects are busy working on new plans, a certain sign that building is planned for the immediate future, and artisans are all busy, as the records kept by the labor unions show and the employment offices indicate. There is a feeling, however, that as soon as the urgent work which is now attracting the attention of the plumbers and others is finished that there will be a quiet spell before extensive operations are commenced again. Those who are contemplating building are inclined to wait before deciding just where and what to build until the retail trade is settled once more in the old sections of the city and the needs of the place can be better judged. There is no question now but that there are more offices than will find tenants in many months. Most of the firms that use offices have removed to these buildings, but there are still dozens of first class buildings that are not half filled. From now on plumbers will find work mostly on small structures, and the building of skyscrapers may be regarded as being virtually at an end for the time being. Store buildings are what are needed now, and it is upon work of this class that plumbers are engaged mostly at the present time. There seems to be no chances at present of the fire limits being changed, and as a result there is a vast district north of Market street that still shows the effect of the fire, and within the limits of which there is but little building being done. As this is the district that is to be regarded as a natural residence section and location for flats and apartment houses, it is to be deplored that no arrangements can be made for the erection of a different type of buildings than are now allowed, for the result is that the outlying districts and suburban towns are reaping the benefits of the restrictions.

Financial Trouble

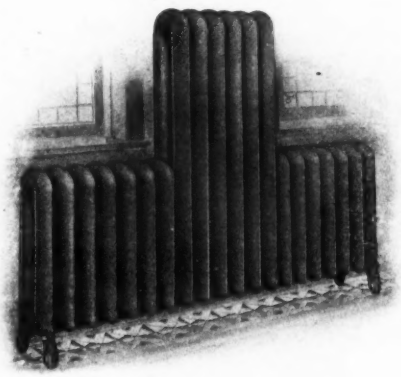
Somerville, Mass.—Walter J. A. Ricker, a plumber, of 54 Paulina street, has filed a petition in bankruptcy. His liabilities are given as $3,834, and he has no assets.

Holyoke, Mass.—The T. F. Kilbride Company, conducting a plumbing business on Main street, has assigned to Thomas H. Sears and P. J. Garvey. The assets are said to be greater than the liabilities. It is stated that the assignment is simply for the purposes of reorganization.

Washington, D. C.—President Roosevelt has ordered Commissioner of Labor Neill to "immediately institute such an investigation and report to me as soon as possible the results of the same, using such of the force of your bureau as may be necessary for the proper and prompt conduct of the work." This investigation into the methods of the issuance of permits and the inspection of work by the local building department is the result of the second collapse of a portion of a structure in course of erection in a few months of one another, in each case causing the death of a workman. It was shown by the evidence before the coroner's jury that very loose methods are in vogue in the office and that this recent structure was being erected on a "verbal" permit, for which no one would actually assume responsibility.

Well-Known Goods.

In selling well-known goods the dealer has much of his work done for him. In the case of an IDEAL-AMERICAN outfit the public has been thoroughly informed by extensive advertising of the good heating results, fuel economy, home comfort, cleanliness, and the many other benefits of Low-pressure Steam or Hot Water Heating with IDEAL Boilers and AMERICAN Radiators.



Thousands of dollars are spent every year to popularize IDEAL-AMERICAN outfits among house owners.

In choosing a line of goods for 1910 the dealer is wise in deciding on those for which there is an active and growing demand. Just remember that the advertising of IDEAL Boilers and AMERICAN Radiators is backed by a fixed reputation for good fitting qualities, full heating service and extra prompt shipments.

AMERICAN RADIATORS & IDEAL BOILERS

AMERICAN RADIATOR COMPANY

General Offices, 282-286 Michigan Ave., Chicago.

New York	Cincinnati	Cleveland	Atlanta	Brantford, Ont.	Denver
Philadelphia	Boston	Milwaukee	Minneapolis	Seattle	St. Louis
Pittsburg	Buffalo	Indianapolis	Kansas City	Omaha	San Francisco

Contemplated Work

Washington, D. C.—Sealed proposals will be received at the office of the supervising architect until 3 o'clock p. m., January 20, 1909, for the construction (complete) of the extension to the United States postoffice and custom house at Springfield, Mass., in accordance with the drawings and specifications.

Washington, D. C.—Sealed proposals will be received at the office of the supervising architect until 3 o'clock p. m. on January 12, 1909, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the United States postoffice at Warren, Ohio, in accordance with drawings and specification.

Trade Literature

From American Steam Pump Company, of Battle Creek, Mich.: A handsomely lithographed calendar for 1909, size 8x10 inches. Will prove a useful ornament for any heating contractor's office.

From Shirley Radiator & Foundry Company, of Indianapolis, Ind.: Calendar for 1909, with weekly pads. Printed with large and plain figures that can easily be seen at a distance. A convenience for any heating and steam fitting shop. Size 8½x11 inches.

From D. L. Hamill Co., 60-62 Delaware avenue, Buffalo, N. Y.: An attractive series of blotters bearing half-tone reproductions of photographs of girls in different poses illustrating questions of ways and means of obtaining an order. Some of the questions illustrated are: Shall we go after the order with a gun? Shall we tell you a funny story? Must we go after it with a big stick? Or shall we go down on our knees for it? The series is very interesting and those who are fortunate enough to secure a set will prize it highly.

From M. Glauber & Company, 10-12 Christopher street, New York City: "Fine Plumbing Specialties." This handsome catalogue, 104 pages, 6x9 inches, bound raycroftie, is a successful effort towards simplifying and standardizing the plumbing specialty line, and the company, in whose interest it is published, deserve great credit for the undertaking. It is probably not too much to say that it has been compiled with so great care that it with its excellent index is one of the most handy reference books as well as one of the most complete catalogues in the plumbing specialty line. It is copiously illustrated with high grade half-tone engravings from untouched photographs of the company's goods, the officers of the company having decided to do this for the reason that they did not care to sell goods by the assistance of pictures that are better than the goods they illustrate, a most commendable view to take. Interested parties who need such a catalogue in their business can secure a copy on request mentioning "Domestic Engineering."

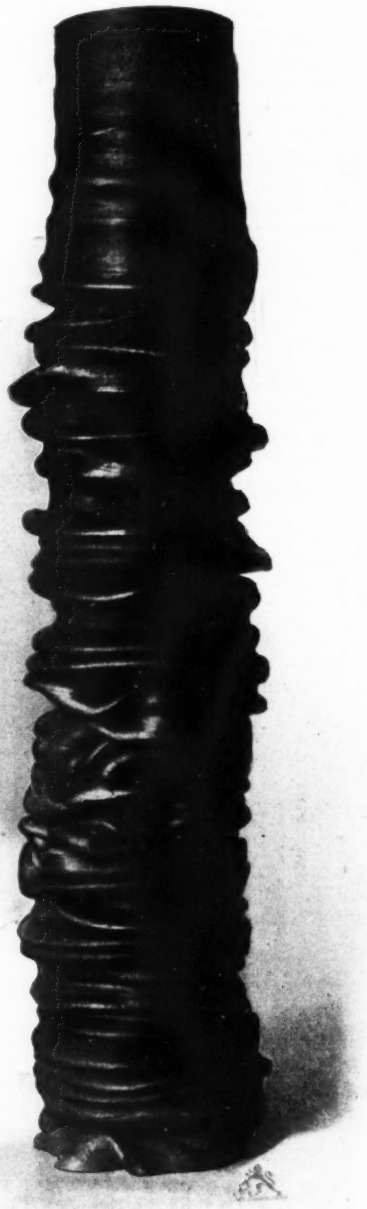
Judge: "Prisoner, have you anything to say in your behalf?"

Prisoner: "Well, judge, it's like dis. Dat lawyer he got me so mis'bly confusticated dat I really dunno what I done nor what I done it for."

With the Makers

The National Tube Company's Exhibit.

The National Tube Company, of Pittsburg, Pa., had a very interesting exhibit in Mechanical Hall in that



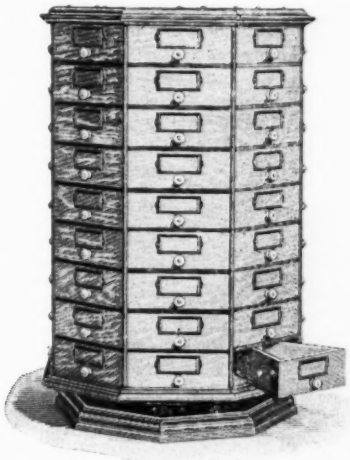
Shelby Seamless Steel Tubing, Hammered at Both Ends.

city at the recent sesqui-centennial exposition, consisting of welded pipe, Shelby seamless steel tubing, valves and fittings. The exhibit was arranged with

such serious attention that a careful study of it gave one a very clear idea of the method of manufacture. In the exhibit were also shown a great number of pieces of Shelby seamless steel boiler tube, which had passed through the most crucial tests, similar to the one shown in the accompanying illustration. This piece of tubing was hammered at both ends until it was twisted out of shape, but without suffering any crack or opening in the material. Another feature of the exhibit that came in for much attention from those in attendance was a dinner set made from Shelby seamless steel tubing on a table made entirely from the same material.

Revolving Cases for Plumbing Establishments.

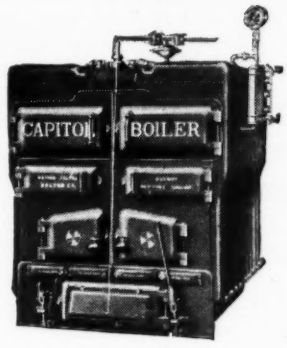
The American Bolt and Screw Case Company, of Dayton, Ohio, manufactures an attractive line of revolving cases or cabinets, which occupy only a small space and can hold a large quantity of small articles, such as tips, burners, washers, bumpers, etc., etc., making them most valuable accessions to up-to-date plumbing establishments. The regular stock of these cases are made of the best seasoned Tennessee poplar, finished in imitation of cherry. The fronts of drawers are made of the best Norway pine, and the drawers are all provided with stops to prevent their removal from the case. The company is also prepared to make cases of oak when this is desired. These revolving cases are made with iron standards screwed firmly into an iron hub, in the bottom, which makes them perfectly true and solid. The tops and bottoms are double, with the grain of the wood crossed, glued and screwed together and braced with iron rods, which bind the whole firmly together, making it strong enough to bear three times the weight that can be put into them, and by which means they also revolve perfectly true and



Revolving Case for Plumbing Stores.

easy. Those interested are requested to write the manufacturers for their new catalogue and price list, and incidentally mention that "Domestic Engineering" gave them the tip.

CAPITOL BOILERS AND RADIATORS



A FAIR QUESTION

When you can sell your customers the BEST for the same price as the **inferior** costs, why not sell the BEST?

CAPITOL BOILERS and RADIATORS

excel in every practical merit. Win on comparison because the purchaser can **see** their excellence of construction. The rapidly increasing demand proves this fact.

Sell **Capitol Boilers**—give your customers the BEST. "It is better to be safe than sorry." SEND FOR CATALOG.

United States Heater Company.

General Offices and Works: Fort St. and Campbell Ave., DETROIT, MICH.

Branches:
DETROIT 139 Jefferson Ave.
NEW YORK 129 Worth St.
CHICAGO 34 Dearborn St.
KANSAS CITY 120 W. 11th St.
OMAHA 916 Farnam St.

Sales Agencies:
ST. LOUIS, MO., L. M. Rumsey Manufacturing Co.
DENVER, COLO., Kellogg & Stokes Stove Co.
MINNEAPOLIS, MINN., Plumbing & S. F. Supplies Co.
NORFOLK & RICHMOND, VA., Virginia-Carolina Supply Co.

The Star Expansion Bolt Company, of Bayonne, N. J., has just established a branch office at 61 Second street, San Francisco, Cal. H. M. Estes, who is in charge, may not be so well known to the plumbing trade as he is to the electrical world, but he is "one of the boys" and he wants to "get acquainted," so send in your name and let him put you on the mailing list for catalogues, samples and some of the "good stuff" the Star people get out regularly. A very complete stock of expansion bolts, screw anchors, cable hangers, basin clamps, drills, drill holders and kindred items will be carried at all times.

A New Portable Heater.

The Anderson-McCutchen Portable Heater.

The Anderson-McCutchen Company, of Peekskill, N. Y., manufacturers of water heaters and steam specialties, has just placed on the market a portable heater, which is attracting well-deserved attention. This heater is not made for the cellar, but to be placed right in the room which it is desired to heat, and it can then be utilized to furnish heat to other rooms, either on the same floor or on the floor above. It is made in three sizes, using the 12, 16 and 20 inch well-known Anderson-McCutchen auxiliary heating sections for the water service. Where it is desired to limit the radiation from the heater the cylinder enclosing the sections is lined with fire bricks. Application for patent on the novel and ingenious features in this heater has been made, and the manufacturers report that their prospects seem to indicate that orders for it will keep them busy for a long time to come. Parties interested in this heater can secure particulars promptly from the manufacturers upon request mentioning "Domestic Engineering."

Patents

905,254. Meter. John D. Walsh, Lockport, N. Y., assignor to American District Steam Company, Lockport, N. Y., a corporation of New York.

905,517. Steam-Trap. Lawrence Hand, Amsterdam, N. Y.

905,366. Cast Iron Boiler. Captain A. B. Reck, Hellerup, Denmark.

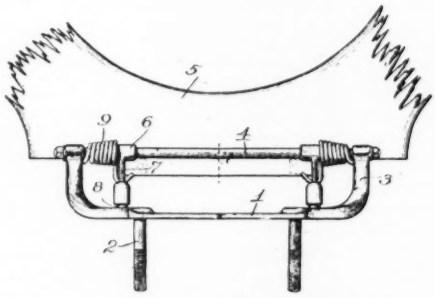
905,613. Heating-Boiler. Harry M. Wells, Alexandria, Ind.

905,717. Lubricating-Pump. Carl Lang, Cannstatt, Germany.

905,787. Tank-Valve. James H. Boggess, Henderson, Iowa.

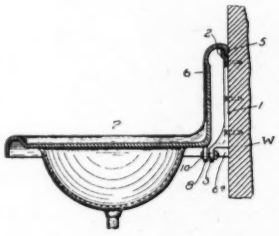
905,915. Hydrant. Denis F. O'Brien, Newark, N. J.

905,996. Closet-Seat Hinge. John H. Davis, Hamilton, Ohio, assignor to the Sanitary Manufacturing Company, Hamilton, Ohio. The claims for this invention are as follows: A closet-seat hinge comprising a base-bar, provided at its ends with rigid upturned arms and forming the fixed hinge-member, separated studs projecting downwardly from the base-bar to



serve in securing it to a closet-bowl, a hinge-pivot seated in eyes in the upper extremities of said arms, movable hinge-members pivoted thereon and adapted to have the seat secured to them, arms rigidly connected with the movable hinge-members and extending rearwardly therefrom in direction substantially at right angles to the attached seat and having portions adapted to make downward contact upon the base-bar, and a spring engaging the fixed and movable hinge-members and adapted to yieldingly support the seat in substantially vertical position, combined substantially as set forth.

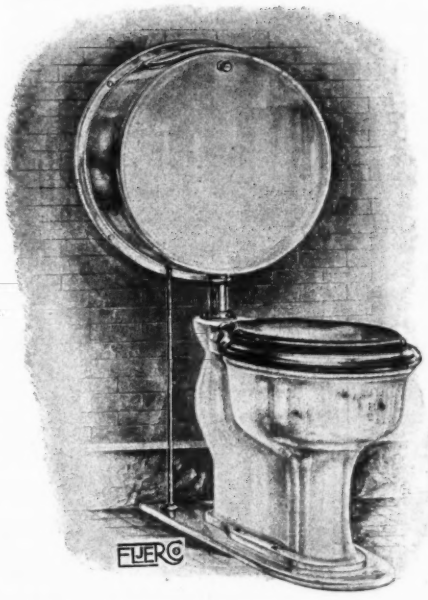
906,247. Lavatory and Receptacle and Support Therefor. John J. Mahoney, Chattanooga, Tenn., assignor to the Cahill Iron Works, a corporation of Tennessee. Among the claims for this invention are the following: In a structure of the nature described, a hanger frame adapted to be secured against a wall and



having a socket, a lavatory having a flanged back-plate and a lug to engage in said socket and having an upright ear in front of and spaced away from said frame, and a horizontal bolt engaging said frame and said ear for forcibly drawing the latter toward the former.

906,034. Sewer-Cleaning Apparatus. John Kelly, Jamaica Plain, Mass.

906,053. Water-Closet. John W. McAuliffe, Chicago, Ill., assignor to the McAuliffe Manufacturing Company, Chicago, Ill., a corporation of Rhode Island.



PATENTS NOW PENDING
Both mechanical and design

ELJER CHINA TANKS

Are circular in shape, are made that shape to prevent all chance of WARPAGE, CROOKEDNESS OR ILL-FITTING COVERS. Has no metal linings or wood joints. They are the best material throughout. To end all tank troubles try the circular Eljer. Every tank guaranteed.

MANUFACTURED BY

ELJER CO.

CAMERON, WEST VIRGINIA

906,152. Automatic Gas Cut-Off. Marcus F. Nichols, Oswayo, Pa.

906,199. Valve-Stem Packing. Edgar P. Coleman, Buffalo, N. Y.

906,225. Pipe-Coupling. Harry D. C. Harrison, Kingsville, Pa.

906,228. Pump. William F. Hervey, Wellsburg, W. Va.

906,259. Molding-Machine. John G. Morrison, New York, N. Y.

906,268. Molding-Machine. Gustav A. Oertzen, Dusseldorf-Obercassel, Germany.

906,277. Pipe-Wrench. Clarence D. Peters, Victoria, Ill.

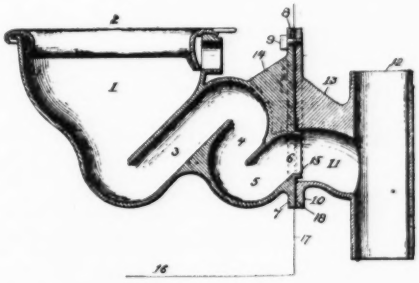
906,285. Valve for Automatically and Intermittently Interrupting a Current of Gas or Liquid. Gustav Von Post, Stockholm, Sweden.

906,287. Hose-Nozzle. Frederick J. Radler, Jersey City, N. J.

906,312. Automatic Device for Operating Water Seals for Gas Mains. Leonard Shaw, Chicago, Ill.

906,320. Water-Storage System for Use in Extinguishing Fires. Lewis H. Sondheim, New York, N. Y.

906,470. Water-Closet. Francis J. Torrance, Allegheny, Pa., assignor to Standard Sanitary Manufacturing Company, Pittsburg, Pa., a corporation. The most notable claim for this invention follows herewith: The combination of a water closet having an integral siphon, a drag leg, a rearwardly extending horizontal outlet extension, a pierced flange surrounding said outlet extension and a web extending from the apex of the siphon and connecting the said flange with the siphon and outlet extension, with a soil pipe having a horizontally disposed branch, a vertical pierced flange carried by said branch, bolts extending through both said flanges and a web connecting the flange on the said branch with the soil pipe. The siphon and drag leg portion extend rearwardly of the closet bowl and terminate in a horizontal boss leading to the soil pipe,



said siphon and drag leg extension being formed with a flange surrounding said boss, and with a vertical web extending from the apex of the siphon to the face of said flange, the flange being pierced for bolts, and constituting the sole means by which the closet, siphon and drag leg are supported above and independently of the floor.

Burlington, Iowa.—The Russell Sewage Disposal Company, of this city, has installed its sewage disposal system (without sewers) at the handsome residence of C. A. Coulter at Farmington, Iowa.—Adv.

CLASSIFIED ADVERTISEMENTS

The rate of advertising under this heading is 10 cents a line an insertion, remittance to be made with order. The average advertisement runs five words to a line. To insure insertion in this column copy should be received not later than Wednesday afternoon.

Help Wanted.

WANTED — EXPERIENCED FURnace and boiler salesman. State age, former employers and salary expected. Giblin & Co., Utica, N. Y.

WANTED—SEVERAL FIRST class salesmen experienced in the sale of plumbers' high grade brass goods. Address No. 995, "Domestic Engineering," Chicago.

WANTED — TWO FIRST-CLASS plumbers to work in an open shop; wages $4.00 per day for eight hours; must be first-class; steady employment for the right men. Address No. 999, "Domestic Engineering," Chicago.

WANTED—TWO FIRST-CLASS Experienced stock men or order pickers, thoroughly acquainted with wholesale plumbing supplies. Address No. 989, "Domestic Engineering," Chicago.

WANTED—THREE EXPERIENCED salesmen to represent manufacturer of steam and hot-water boilers in the eastern states, New York, Pennsylvania and Ohio. State age and experience, with references. Address No. 998, "Domestic Engineering," Chicago.

WANTED—BOILER SALESMEN TO work in New York, Pennsylvania and New England states territory. Must have experience, a good trade acquaintance, and capable in every way. References required. Address Walker & Pratt Mfg. Co., 31-35 Union St., Boston, Mass.

WANTED—SALESMAN FOR NEW York territory, Albany to Syracuse; also for northeastern Ohio and northwestern Pennsylvania. Applicants must live in the territory and have acquaintance with the boiler and radiator trade. Address Heating Department, The J. L. Mott Iron Works, New York, N. Y.

WANTED — A TRAVELER TO cover the territory of Illinois and portion of Indiana, to represent a very well known large manufacturer of plumbers' supplies. Must be of good habits and have acquaintance with the architects and the retail trade in the territory mentioned. Give your references and salary expected. Address No. 985, "Domestic Engineering," Chicago.

WANTED—ONE OF THE PROgressive jobbers operating in the states of Ohio, Michigan and Indiana and having ample capital for extension of their present business desires to employ three capable salesmen to represent them in plumbing and heating lines. Only live, up-to-date men considered. State full details, where employed at present, salary, sales for past years, age, experience and other facts of interest. All communications strictly confidential. Address No. 986, "Domestic Engineering," Chicago.

One advertiser in this column wrote us under date of Dec. 15, 1908: "Please discontinue our advertisement in your paper, as one insertion brought the desired results; we fear we would be flooded with correspondence if it were run another week."

Situations Wanted.

POSITION WANTED FOR 1909 BY first class plumber, either as Journeyman or Salesman; 18 years' experience; south preferred. Best of references. Address No. 1,000, "Domestic Engineering," Chicago.

HEATING AND VENTILATING Engineer, technical education and fifteen years' practical experience desires to make a change. Eastern firm preferred. Address No. 996, "Domestic Engineering," Chicago.

A YOUNG MARRIED MAN, FAmiliar with every detail of the plumbing supply business desires to make a change. State position to be filled and salary. Address No. 977, "Domestic Engineering," Chicago.

SITUATION WANTED—BOILER and radiator salesman, experienced, reliable and energetic, desires New York City and Brooklyn territory. Want better opportunity than present position affords. Address No. 1, "Domestic Engineering," Chicago.

POSITION WANTED FOR 1909 BY first class salesman; ten years' experience; thoroughly familiar with plumbing and steam goods of every description; splendid acquaintance with jobbing trade through New England and middle west; highest references as to ability, character, etc. Address No. 991, "Domestic Engineering," Chicago, Ill.

For Sale.

FOR SALE.—ONE FOUR HUNDRED horse power Warren Webster feed water heater, safety valve grease controller, complete; used six months; reasonable. Address M. J. Hawkins, Albany, N. Y.

Agencies Wanted.

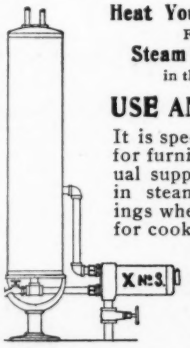
SALESMAN—EXPERIENCED, DEsires to represent manufacturers of plumbing, steam and gas specialties, salable to jobbers' trade in New York and vicinity. Address Pearce & McCall, 140 W. 42nd St., New York City.

BOOKS.

Swimming Pools.—Their construction, cold and hot water supply; various methods of heating water; directions as to selecting correct sizes of heaters. A complete guide, containing the latest information on the subject. By Jno. K. Allen, Associate Member of American Society of Heating and Ventilating Engineers, Editor of "Domestic Engineering." Over 30 illustrations. Bound in cloth. Price, 50 cents, postage paid. "Domestic Engineering," Chicago.

Fifty Plumbing Charts.—A Layout of fifty Jobs, giving sizes of all piping, Roughing-in Details for all Fixtures, etc. An awfully handy Reference—when in doubt—for the small sum of 25 cents, postpaid, delivered. "Domestic Engineering," Chicago.

Practical Steam and Hot Water Heating.—By A. G. King. This work consists of a series of blue prints, showing in full detail the proper installation of steam and hot water heating plants. It is a practical book for the practical man. No steamfitter's library is complete without it. Price, $5.00, delivered. "Domestic Engineering," 49-53 N. Jefferson St., Chicago, Ill.



Heat Your Range Boiler
From Your
Steam Heating Plant
in the Basement.

USE AN X HEATER

It is specially applicable for furnishing a continual supply of hot water in steam heated buildings where gas is used for cooking.

Write for particulars and prices.

X SPECIALTY COMPANY,
46 Weir St.
Taunton, Mass.

Export Trade

A firm having connections in important trade centers in England and Continent

Manufacturers and Jobbers

are requested to send Price List and Quotations to the

COLUMBUS SHIPPING CO., Ltd.
71 High Holborn, London, W. C., England

Rack Labels

Practical for Plumbers

They are mighty good things, ought to be in every shop. Easily applied to shelves, racks or drawers. Shows what you want at a glance, no more guessing or delayed customers. Not only tells the article but illustrates it. Systematizes and facilitates stock taking, gives a neater and smarter appearance to shops. It's a money saver! Printed on water-proof card in plain readable type. Prices low—prices direct or from F. W. Webb Mfg. Co., Elm St., Boston, Mass.

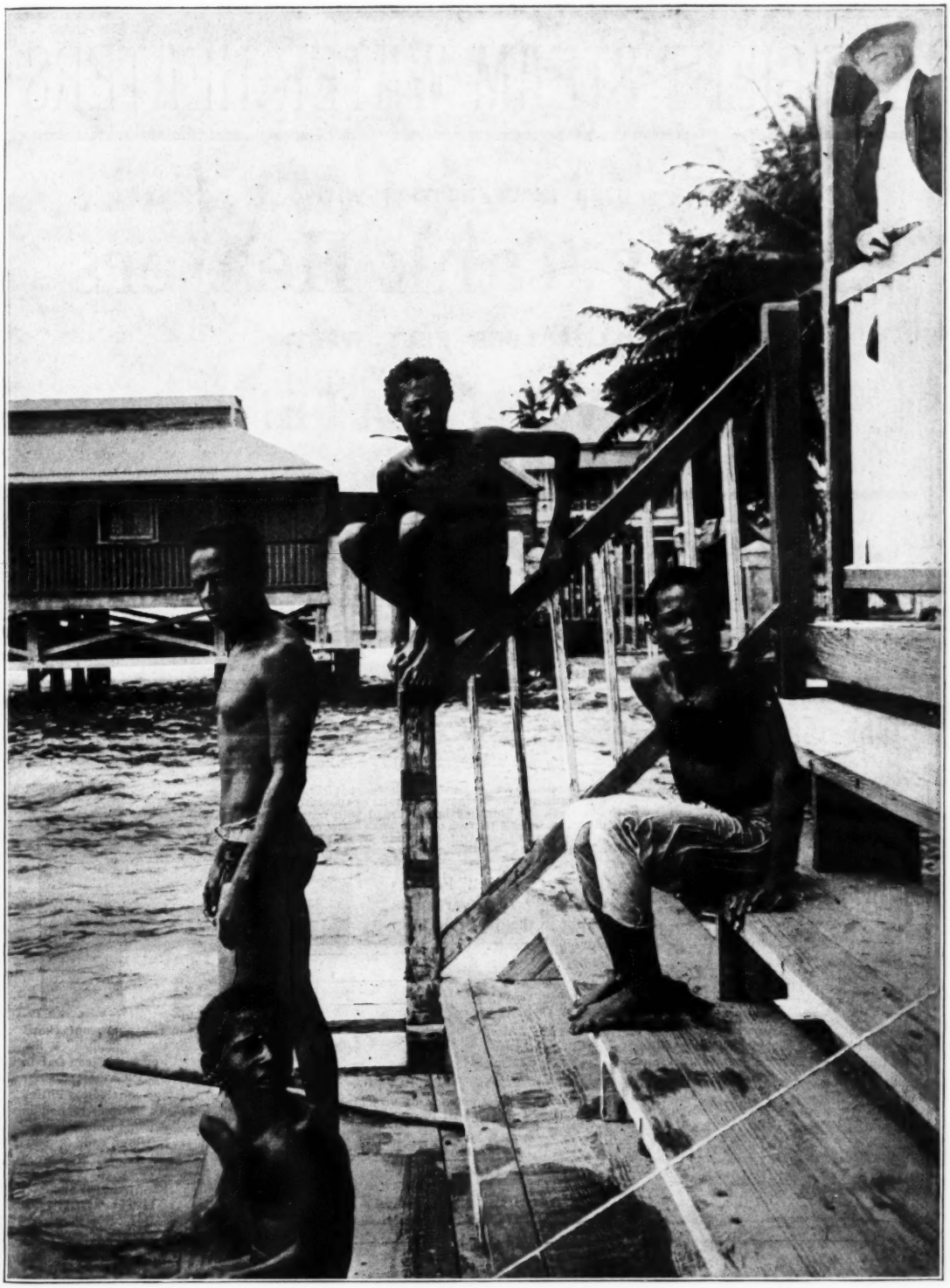
MERCANTILE LABEL CO.
NASHUA, N. H.

Patent Dec. 8, 1908

Adjustable Radiator Foot Rest

The time saved on each job pays for them—can be used for bath tubs and other fixtures

The Jennison Company, Fitchburg, Mass.
Sold by Jobbers



Photograph copyrighted, 1906, by Underwood & Underwood, New York.

In Summer Climes: Negro boys ready to dive for pennies in front of Myrtle Bank Hotel, Kingston, Jamaica. Since this photograph was taken all these piers have been destroyed by fire following the earthquake.

EFFICIENT STEAM WATER HEATERS

USED IN CONNECTION WITH

Sunray Tank Heaters

FILL A LONG FELT WANT

INVESTIGATE!

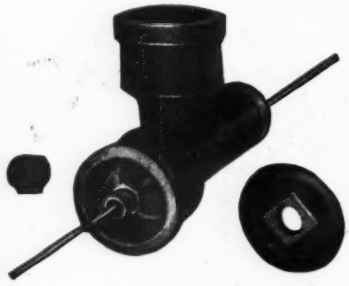
MADE BY

THE J. L. MOTT IRON WORKS

Boston Chicago New York, 5th Avenue and 17th Street Denver San Francisco

"The Campbell" CLEAN OUT FITTINGS

(PATENTED)



Above cut shows manner of removing obstruction through "Campbell" Fitting without disturbing Trap Screw Plug.

Plug can be removed from Fitting in usual manner if desired.

Are tapped in body back of hub where it is reinforced, making them heavier than the regular or standard fittings. The clean out plug has brass thread with nipple in one piece, extending to face of hub with loose cover plate. A Trap Screw Clean Out, a continuous Soil Pipe Fitting, a Test Plug and Drain Connection combined in one Fitting.

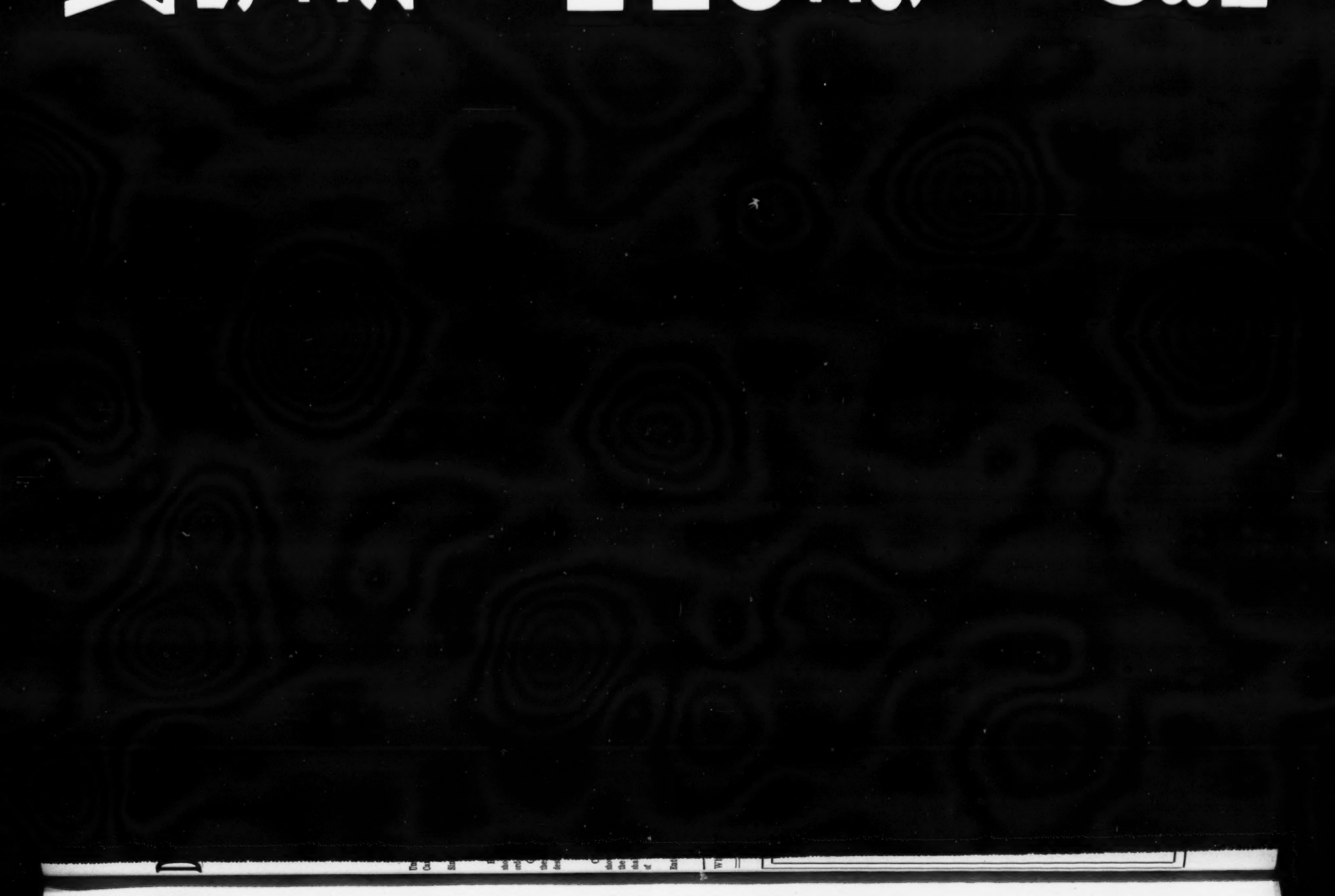
Try "The Campbell" Fittings and you will never again Caulk in the old Style Trap Screw Ferrule.

This cut shows the manner of attaching hose connection to "Campbell" Clean Out Fitting for testing job or flushing sewer.

The above cut shows the "Campbell" Y Fitting with Clean Out in branch, a most superior and satisfactory Fitting All fittings tapped in run and branch for use in either end.

Campbell Mfg. Co.
GADSDEN, ALABAMA.

Manufacturers of
HIGH GRADE
SOIL PIPE and
FITTINGS
That are Straight
and Easy to Cut.

SEND FOR SAMPLES

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXVI.